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SPECIAL REPORT: Fish Wisconsin 2000: a better, bigger catch

WISCONSIN NATURAL RESOURCES

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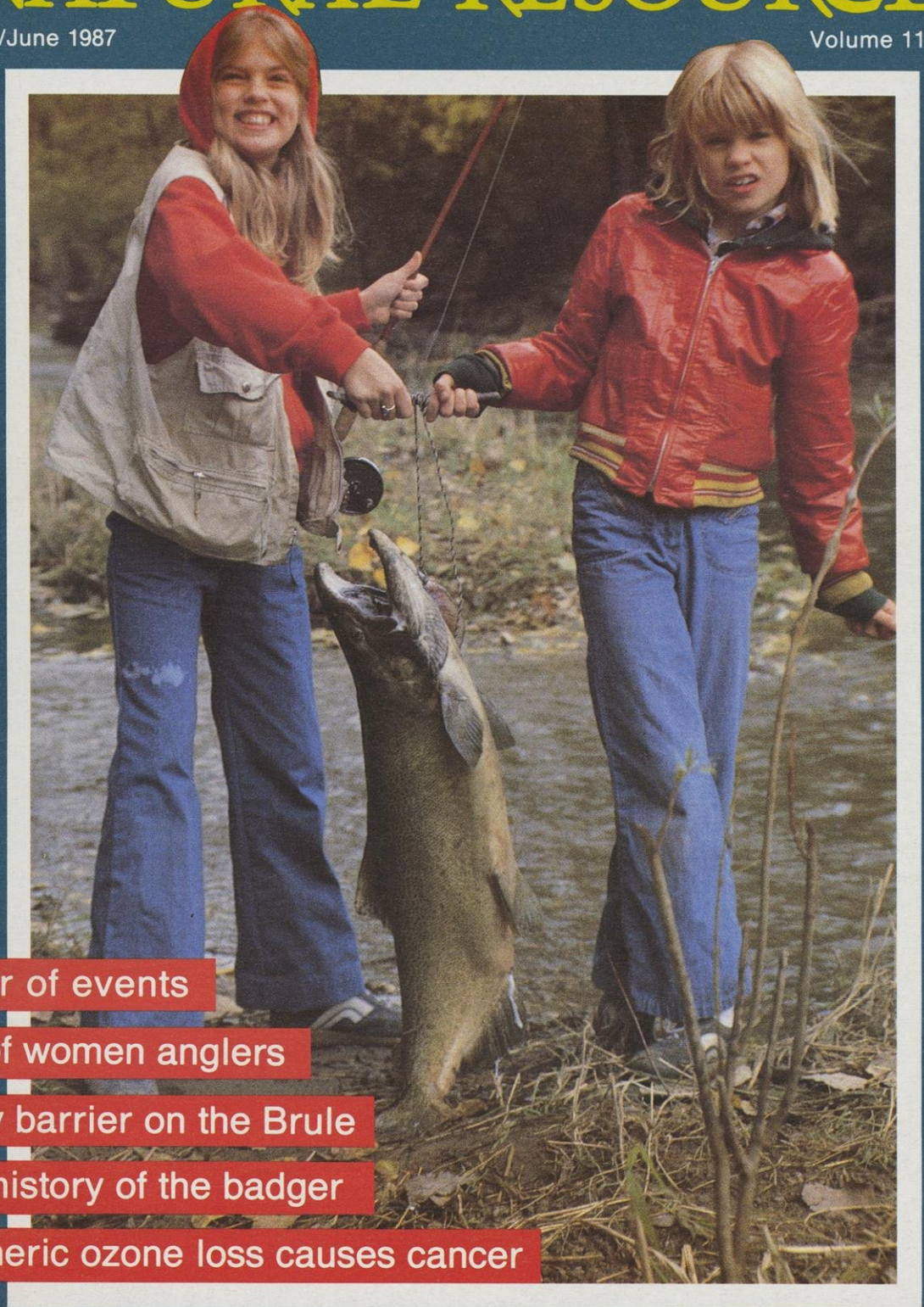

Calendar of events

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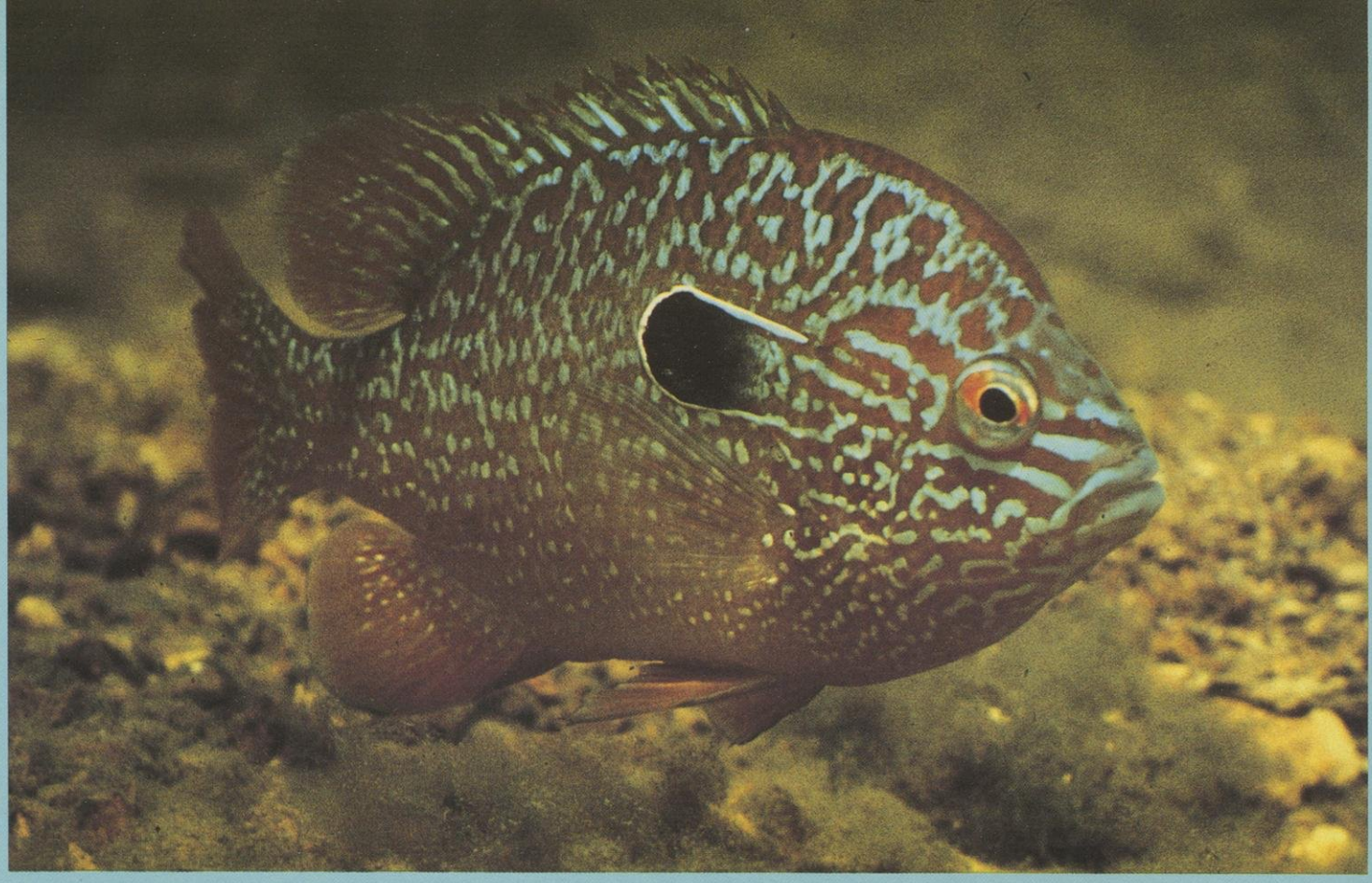

Wisconsin's Longear Sunfish

The longear sunfish, *Lepomis megalotis*, resembles an exotic tropical fish and almost seems out of place in the lakes and streams of Wisconsin. Threatened here, but plentiful elsewhere, this fish is a painter's palette of bright colors. Its back is olive to rusty brown with lighter sides, while its breast and belly are yellow to orange-red. The back and sides show specks of yellow, orange, emerald and blue. The large earflap that inspired the fish's name is black, and narrowly edged with pale red to yellow in mature specimens. Its scientific name translates as "scaled gill cover" *(Lepomis)* and "great ear" *(megalotis)*.

This sunfish likes warm, clear, shallow water with some vegetation. Typically two to four inches in length, in some places the longear grows to eight inches. A peculiar behavioral characteristic is the so-called "comfort movement" in which longears brush their sides or bellies along the lake or stream bottom or on a protruding stick. Insects, small invertebrates and an occasional small fish are food preferences. The longear will feed on the fry of its own species if a nest is left unattended by the guardian male.

Most nesting occurs in small, crowded colonies, although sometimes hundreds of nests have been observed so close together the edges touch. Mating begins in mid-May and continues to late July or early August. The breeding male is iridescent green above and bright orange below. Extremely aggressive toward competition, he builds his nest in shallow water with a sweeping action of his tail, preferably in gravel, but hard mud or sand will also do. Then, he tries to attract a passing female by darting out and rapidly swimming around her. After a female enters the nest, the pair circle one another. Every 10 to 15 seconds she rolls on her side to release eggs which are fertilized by the male. Sometimes two females are in the nest simultaneously, but the male chases one out. Immediately after a female leaves, the male vigorously fans the nest to cleanse the eggs of excess sperm and drive them into cracks between the pebbles for protection from predators. Males guard the nest until the young have completed early development and are ready to leave. Hatching takes place in three to five days. Sometimes a male will continue his guard duty even after the young have left.

Hybridization sometimes occurs with other sunfish when longear populations are low as they are in Wisconsin. When given the choice, however, the longear will court its own kind.

Under controlled conditions, longears have been induced to spawn regularly every six to 10 days for a period of 14 months. This has led scientists to believe the species holds promise as an experimental laboratory fish.

Wisconsin is at the limit of the longear's northern range, but it makes its home as far south as Mexico. It is the most predominant sunfish in Bull Shoals, Arkansas. Here in Wisconsin, however, the longear is found in only three localities: southeast in the lower Root and Milwaukee rivers; the east central part of the state in the Pensaukee River; and northwest in Lac Court Oreilles which has the state's biggest lake-dwelling population. The longear inhabits only 11 streams and seven lakes in Wisconsin. Anyone who happens to catch one should release it unharmed, by cutting the line if necessary to avoid removing the hook. Possession of this threatened species is allowed only by special permit from DNR.

Naomi Hubbard, Editorial Intern

Cover: Sisters Daniela and Audra Johnson took turns playing this big chinook on the Root River near Racine after their dad hooked it. It took them 10 minutes to land it. Photo by Gerald C. Johnson

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Aldo Leopold

The present winter and our native game birds

Aldo Leopold

We continue our observation of the Aldo Leopold 100th anniversary with another Leopold essay reprinted from this magazine's predecessor, *The Wisconsin Conservation Bulletin.* This essay describes the effects of a mild, snowless winter on birds, similar to the one just past. It was first printed in February 1944. More Leopold writings from the old "Bulletin" will be reprinted here later this year.

This winter is, so far, one of the mildest of recent decades. Only one winter, 1931-32, was equally mild, equally snowless and otherwise favorable for wildlife.

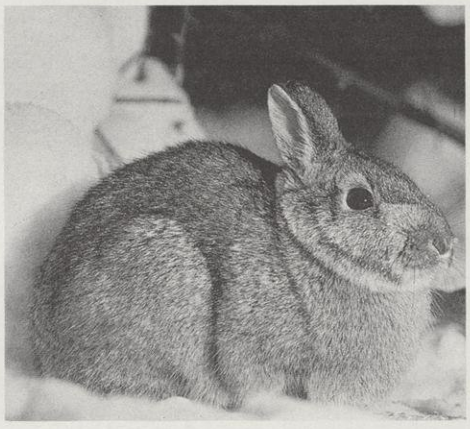
Mild weather, however, is no blessing to the birds. It enabled farmers to do lots of fall plowing, and to haul most of their corn out of the fields to the barnyard. This reduced the supply of weed seeds and waste grain available for winter wildlife food. Should there be deep snow later, it might yet bring starvation to quail and pheasants.

That the birds are so far on "easy street" is attested by their refusal to enter traps. Each winter the University tries to trap and band as many quail and pheasants as possible on the University Arboretum, and on a study area near Prairie du Sac. By repeating this year after year, we learn the movements of individual birds, and their mortality rate.

Usually by New Year's my students and I have trapped and banded a hundred birds. So far this year we have caught "nary a feather." The birds are "thumbing their noses" at our allurements. Our temptingly baited traps do not interest them.

Trapping rabbits

We have, however, trapped and ear-tagged about 50 rabbits on the Arboretum. The purpose is to get a rabbit census. Rabbits can't be counted on the wing like birds, for most of them spend the day underground. We get our census by trapping and ear-tagging until the traps yield only rabbits already tagged. The number tagged is the population resident on the trapped area. Last year the Arboretum had two rabbits per acre. This year the cycle has reduced the population, but how much? We hope to find out.



Leopold started a rabbit census at the UW Arboretum. Photo by Greg Scott

Making a rabbit census by tagging requires so much labor that few have undertaken the job. The result is that we know almost nothing about the abundance, in numbers, of this, our commonest game animal. We know that Wisconsin hunters kill a million rabbits a year, but we do not know whether this is a tenth, or a quarter, or three quarters of the population.

Carrying capacity of the range

Coming back to game birds: A mild winter ruins our bird trapping, but it also has a special value to research workers: it enables us to measure the "carrying capacity" of sample ranges. Perhaps some of you would like to know what carrying capacity means. The carrying capacity of a range is the level at which predators cease to reduce the population. It is hard to measure capacity in severe winters, because in such winters starvation, as well as predation, is killing birds.

You will, of course, ask why predators cease reducing the population at this particular level, which we call the "capacity level." Certainly it is not because they cease trying. As nearly we know, it is because the birds cease to evict each other through social intolerance. Apparently, birds are vulnerable to their natural enemies only so long as they quarrel among themselves. They quit quarreling when they have enough "lebensraum" in the form of good cover and food. Statesmen would do well to ponder this biological fact. Perhaps we humans are likewise intolerant when crowded.

Another way to define carrying capacity is this: it is the number of birds which survive until spring during a mild winter. On any given range, this survival level shows much consistency from one mild winter to another. In severe winters starvation often reduces the level far below capacity, but predation never fails to reduce the population, at least to capacity level by spring, regardless of how many birds were present in fall. Apparently predators are an automatic safety device for preventing slums among our birds. The valve closes when population pressure has been reduced to a favorable point.

Leopold found that a mild Wisconsin winter changed the behavior of bobwhite quail. Photo by Herb Lange

Prairie du Sac quail study

On the Prairie du Sac study area, the carrying capacity for bobwhite quail has declined from about 330 in 1929 to 150 in 1943. This decline, as far as we know, represents the decline of good winter food and cover brought about through grazing of woodlots, debrushing of roadsides and fence rows, and perhaps loss of soil fertility. This fall we had about 200 quail on the area, but they are losing steadily despite the mild weather. This means that they still lack elbow room, are quarreling among themselves, and evicting surplus coveys to undesirable locations, where they are vulnerable to owls and foxes. Shooting owls and foxes is no remedy, for 14 years of experience has taught us that population in excess of capacity disappears anyhow, regardless of whether natural enemies are plentiful or scarce.

Behavior of bird populations

When I use such words as quarreling, intolerance, lebensraum, etc., I am of course using human terms applicable only to the human mind. The mind of a bird is something else; we know nothing about it. But we can measure the behavior of populations, and their behavior is as if these terms applied.

It is important to understand that the birds are unconscious of anything except a desire to eat, keep warm, and escape enemies. This is true of most people. The intolerance of birds when crowded is automatic; perhaps ours is. We have evidence that old birds are more intolerant than young, and that hungry birds are more intolerant than full ones. We ought to recognize these peculiarities, for they are ours, too. Perhaps the study of birds may yet teach us something about ourselves.

Lamprey barrier

a story of persistence

Gale Holloway, DNR Engineer, Madison
Jim Bishop, Public Information, Spooner

Early history of the Brule River in Douglas County tells of fantastic fishing there when the first settlers arrived. Trappers had reduced the beaver population and with few dams on the stream, native brook trout migrated to and from Lake Superior and flourished. By the late 1800s, fishing trips to the river were a cherished pastime and several exclusive clubs owned cabins along its banks. Catches were often so good some anglers would remove the barbs from their hooks to creel fish faster. Wagonloads of Brule River trout were sold to restaurants in Duluth. Later, President Coolidge and other dignitaries wet line on the Brule.

Today, trout fishermen still revere the Brule as a productive and beautifully scenic river that delivers big action. But in addition to record fish, until recently the river also nourished record numbers of a terrible scourge: the spawning sea lamprey, destroyer of Great Lakes trout.

An exotic parasite, the Brule lampreys had confounded international fishery experts for 50 years. But trial and trauma finally came to an end on a cool March afternoon in 1986. On that day, DNR fish managers, technicians and engineers stood on a new steel and concrete structure along the shore. They waited with anticipation as final adjustments were made. Then project coordinator Dennis Pratt gave the okay. "Let'er go Bill!" he shouted.

The Brule River produced record trout and record numbers of parasitic lamprey too. Problem: keep the trout but get rid of the parasite. It wasn't easy!

A man turned the wheel crank. The gate opened and water began spilling into the raceway, filling the system of deep concrete pools and rushing over a series of ladder-like steps.

Just then a voice came from the hill: "Think it'll work this time?" The DNR men turned to see an early spring angler who'd made his way along the bank. Pratt, who's also the fish manager at Superior, nodded and grinned.

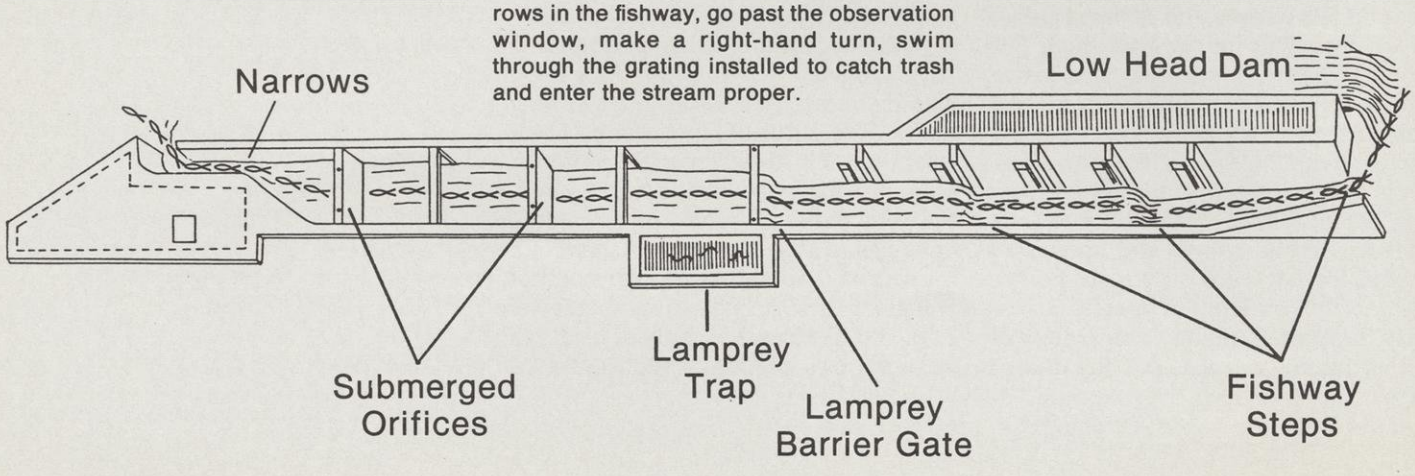
"Yes, it'll work!"

Within weeks, a DNR fish counter began logging steelhead jumping the main barrier gate. These Lake Superior fish, driven by the urge to reproduce, passed easily through the structure toward spawning grounds upstream. But not the lampreys! On May fifth the first of the snakelike, parasitic bloodsuckers was caught. Unable to get over the barrier gate, it swam along the gate wall and into a special trap. On May 27th, 2,000 lampreys were caught.

Many more followed. The barrier worked! US and Canadian fishery personnel along the Great Lakes toasted its success. A new solution to the parasitic lamprey problem had been found and none too soon.

How a fish maneuvers through the barrier:

Unable to jump over the low-head dam stretching across the river, fish enter the barrier (on the far right) and make their way over three fishway steps. When they reach the lamprey barrier gate, they either swim up through the flow or jump the gate. Water velocity over the gate is mechanically controlled to ensure that it exceeds the swimming capability of sea lamprey. Unable to move farther upstream, the lamprey are directed into the trap and disposed of. The fish, once past the barrier gate, swim through a series of submerged orifices, come to a narrows in the fishway, go past the observation window, make a right-hand turn, swim through the grating installed to catch trash and enter the stream proper.



Wisconsin's unique fish ladder/ lamprey barrier on the Brule River. Photo by Fred Kruger

More than 2,100 lamprey were caught in the new trap on May 26, 1986, a record number for a single day. Photo by Dennis Pratt

Sea lamprey quickly weaken and kill fish by draining body fluids. Great Lakes Fishery Commission photo

Professionals will tell you, though, that few things come easy in the fish management business. The milestone lamprey barrier is a case in point. Its story is laced with sweat and some tears.

Originally sea lampreys lived in the North Atlantic. They sneaked into the Great Lakes via the Erie and Welland canals in the 1930s, then in 1938 were discovered in Lake Superior. There they multiplied rapidly and began taking a toll on commercial fishing. The Brule came into the picture because lampreys spawn in tributary streams and the river is a perfect nursery.

During the 1940s and 50s lamprey decimated lake trout, whitefish and chub populations in lakes Superior and Michigan. They feed by attaching themselves to the side of a fish, using teeth to rasp through scale and skin and suck out body fluid. Many fish die from the predation, others live and carry a scar. It's been estimated that a single lamprey can kill 40 pounds or more of fish in its lifetime.

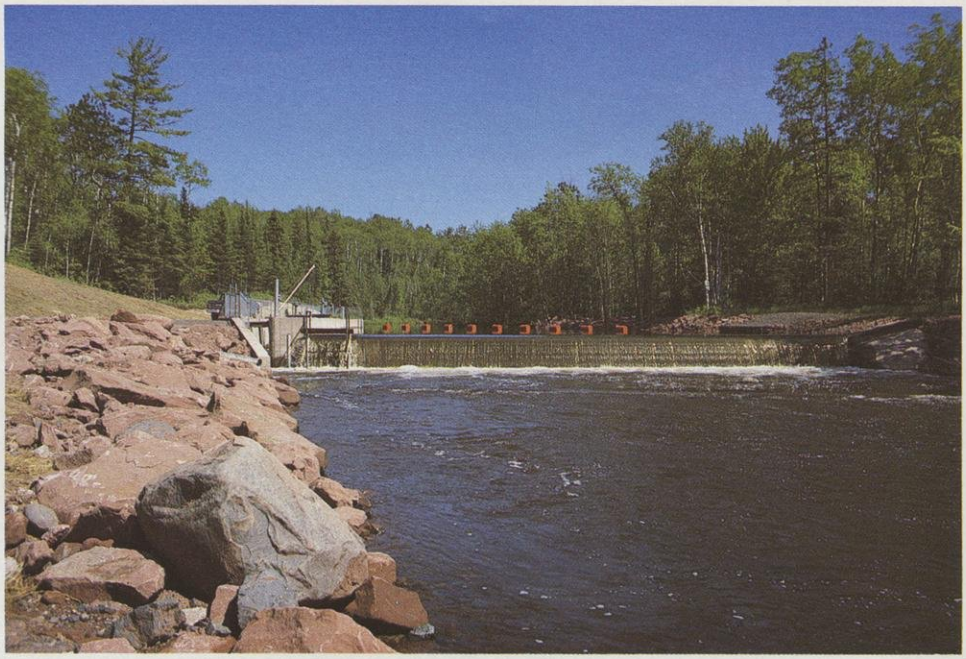
To confront the problem, in 1955 the Great Lakes Fishery Commission was formed to work with the US Fish and Wildlife Service and the Canadian Department of Fisheries and Oceans in a full-scale war on the lamprey.

Many new methods of attack were tried. Trapping at existing mechanical weirs and electrical barriers was intensified and additional barriers installed in streams with large lamprey populations. But mechanical and electrical barriers left a lot to be desired. Sometimes desirable fish were harmed or the barriers failed to work under high water conditions. They were also expensive to operate. Several types were tried, but none proved reliable enough.

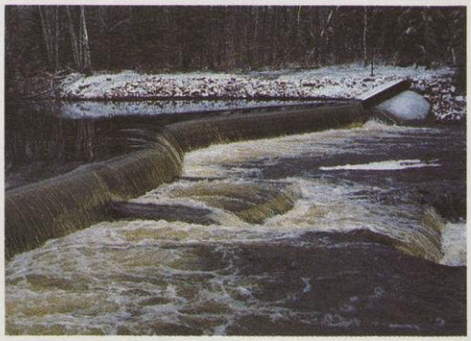
Then in the late 1950s, after years of testing, researchers isolated a chemical called TFM that would kill the stream-dwelling "ammocoetes"—the larval stage of lamprey—before they could migrate into the lakes as parasitic adults. The chemical was essentially nontoxic to humans and showed minimal effects on aquatic plants, invertebrates, fish and waterfowl.

In 1958, the last year before chemical treatment of the Brule, the river produced 22,000-plus lampreys, the largest single-year catch ever recorded at a monitoring weir on a Lake Superior stream. Even after chemical treatments began, the strong Brule attraction continued, making it the prime river for control efforts.

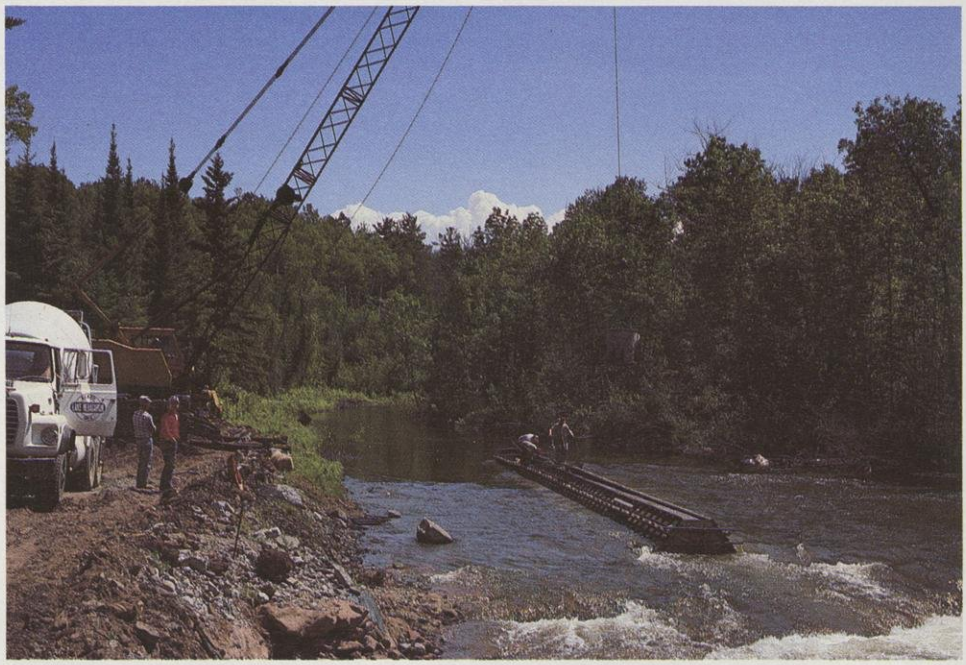
While the chemical was very effective against the lamprey, TFM had its drawbacks. Treatments for the Brule cost about $45,000 each; the chemical had, in



The new barrier let spawning fish through without difficulty. Photo by Dennis Pratt



The original barrier blocked many of the fish as well as lamprey. Photo by Gale Holloway



The first stage in building the fish ladder was construction of a cofferdam, which also served as the retaining wall for a temporary fishway. Photo by Dennis Pratt

some concentrations, killed juvenile trout and salmon; and the size of the river and wide dispersion of ammocoetes made eradication nearly impossible. Fishery personnel continued their search for methods to control the pest.

Early in the 1970s, DNR conducted a feasibility study for a barrier dam on the Brule near the site of the electrical weir. Subsequent investigation, and an environmental impact study eventually recommended against building the barrier dam. The project was closed out and no further design work done for several years while the search for a location that would have less impact on the environment continued.

Meanwhile, estimates by the Great Lakes Fishery Commission were showing that between 30 and 50% of all lampreys captured on American tributaries of Lake Superior were caught in the Brule. These facts spurred action and in 1984 a lamprey barrier was built at Kleppen's Falls, about 6.5 miles upstream from the lake. DNR's design had been reviewed by federal, state and local officials as well as the general public.

The promising barrier consisted of a low-head dam with a metal lip on the downstream edge. The lip stopped lamprey from using their suction mouth to bypass the structure. A fishway consisting of two jumping pools provided access to the upper river for migratory fish. Water velocity going over and through the structure was too great for a lamprey to swim through.

Near ideal working conditions saw the barrier completed in September 1984, in time for the fall trout run. Fish managers, engineers, anglers and local citizens all watched anxiously. During normal water flows, fish would enter the downstream end of the barrier and make their way over the structure via the jumping pools.

State officials soon found, however, that water turbulence into the pools was too great for the fish to swim through. Modifications in the structure allowed many fish to proceed, but totally free passage of fish didn't happen. Something else had to be done.

Meanwhile, the townspeople of Brule along with anglers from Wisconsin, Minnesota and elsewhere all complained bitterly. On this world famous trout stream, few fish were being caught upstream of the barrier.

In early November, the Department of Natural Resources called a public meeting at the town hall in Brule. About 150 people attended and spoke their views. Many wanted the barrier removed and the site returned to original condition. Others were steadfast in their conviction that the sea lamprey problem was real and wanted it corrected.

What followed was a commitment by the department to redo the structure. A task force of DNR officials and interested citizens took on the project. Comments were solicited from fishery personnel in Washington, Canada and Michigan, but the problem was so unique it had to be solved in Wisconsin. DNR engineers went to work again and came up with a new, more workable design. The task force then took it to a public meeting in Brule.

Construction began after the spring spawning run in 1985. About two-thirds of the old barrier, including the jumping pools, was removed. In its place went a 158-foot-long, 10-foot-wide fish ladder. The strategy? Rather than have fish jump a succession of pools they would swim their way up and over a series of steps. The last step, created by an adjustable gate with a protruding steel lip, would divert lampreys into a trap.

Also designed into the structure was an instream view chamber. It's in a concrete room with a trapdoor manhole entrance. A thick viewing window at the upstream end of the fishway allows counting and identifying passing fish.

Of interest is the fact that canoeing was not hindered by the barrier. A floated safety rope and signs were installed to divert travelers to a short portage.

The $230,000 structure—50% funded by the Great Lakes Fishery Commission—was completed in March 1986. The facility became fully functional in mid-April.

An unexpected bonus is that the ladder proved to be a popular attraction to fishermen and visitors in general: all steelhead migrating upstream through the barrier were visible as they passed over the gate. Meanwhile, when the first lampreys reached the barrier in early May, they were unable to negotiate the barrier gate and were readily attracted to the trap.

During the first few months more than 7,000 lampreys were captured and removed from the river, with a peak take of 2,100 on May 26th—the largest single-day capture on record anywhere since lamprey were discovered in the Great Lakes. To reach maturity, those 7,000 lampreys had consumed about 280,000 pounds of fish from Lake Superior—an amount greater than the annual commercial and sport fishery harvests combined.

With the success of the new barrier, its potential construction on other streams in Wisconsin and elsewhere becomes more feasible. Meanwhile, DNR fish managers are planning short-term and long-term fish and lamprey research projects on the Brule with the fishway playing a crucial part. State and federal officials will closely monitor the barrier and its effect on sea lamprey populations.

For the first time since study and management began on the river, accurate and detailed information on fish populations using it will be available. The observation window will be used to tabulate fish by species as they move through. Future plans call for a video camera in the view chamber to record fish movement. The Lake Superior Steelhead Association and the Brule River Sportsmen's Club have donated funds for the equipment.

Says project manager Pratt, "We now have the opportunity to extract some of the best information in the nation on trout and salmon runs."

Pratt says the view chamber is already proving to be a very useful fish management tool. In late summer and early fall last year, the following movement past the window was recorded: 4,896 brown trout, 5,722 steelhead, 5,247 coho salmon and 651 chinook salmon.

"We've also learned that trout and salmon don't move in the stream system when water temperature goes below 35 degrees Fahrenheit. Also, lake run fish tend to travel on rainfall events. Higher, dirty water probably gives them more security from predators such as eagles, hawks and otters."

The facility is expected to reduce the number of lampreys produced annually in the Brule from several thousand to near zero. This means the barrier will very quickly pay for itself by increasing fish production in Lake Superior. Combine that with recent advances in establishing a self-sustaining lake trout population there and the future of the fishery seems highly optimistic. In addition, the Brule sport fishery should benefit from eliminating detrimental and expensive chemical treatment.

"Improving our present lamprey control methods is of greater benefit than fish stocking," Pratt says. "That's because improvement ensures the viability of the stocking programs.

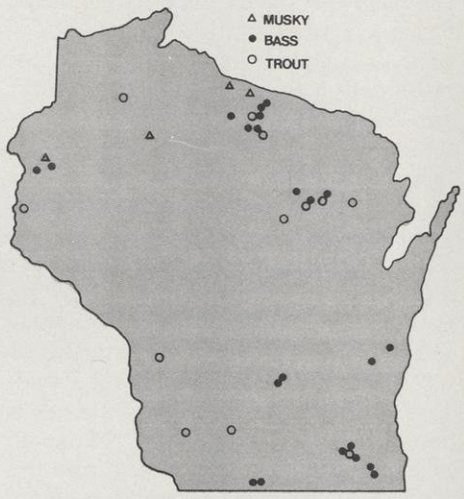
"Without a doubt, you have to feel that the barrier is one remarkable tool."

Testing fishing regulations in Wisconsin

Ron Poff, Chief, Inland Fisheries

Many of the weapons in DNR's arsenal of fish management techniques are getting a complete review to find out how well they're working. The evaluation includes everything from new scientific approaches like slot size to longtime programs like fly fishing only. It assesses special regulations as well as harvest, season, bag and size limits for the state's commonly-fished inland water species.

The probe into how well the rules are working grew out of concern by anglers and biologists about certain lakes and streams. In some waters, fishing quality has declined, while in others success hasn't lived up to potential. Organized fishing clubs with muskellunge, bass or trout as their special interest have shown strong support for the review.



Waters where experimental regulations are being tried and evaluated.

Special trout regulations

About a dozen different trout streams around the state have had special rules on bag limits, size limits and fishing methods to provide anglers with a variety of fishing experiences. Most have big size limits coupled with reduced bag limits or require the use of artificial lures or flies only.

For years, the Peshtigo and Wolf rivers have had special regulations designed to improve catch size and provide special opportunities for trout anglers on large rivers.

McGee Lake in Langlade County has a bag limit of two trout with artificial lures only. The lake could produce trophy brook trout if anglers would properly release hooked fish.

In Rusk County, on the South Fork of Main Creek, the season bag limit is restricted to five fish to protect large brook trout.

A stretch of the Plover River in Marathon County has a 13-inch size limit on brook trout with only artificial lures allowed. The idea is to increase the size and number of brookies in a part of the stream where habitat has been improved. A four-year study shows that this has already happened on the Race Branch of the Willow River where similar rules have been in effect. Before and after surveys on the Plover should reveal whether it helped there.

"Slot" size limits have existed for several years on part of the Namekagon River in Sawyer County and on Trout Creek in Iowa County. These regulations prevent anglers from keeping fish that fall within a certain size range, or slot. They're designed to make the size of trout in the streams bigger, give anglers a chance to catch small as well as large fish and provide a good catch-and-release fishery for mid-sized trout. The Namekagon River has a 10-to-15-inch slot, while Trout Creek has 14 to 18 inches. So far, evaluations are encouraging.

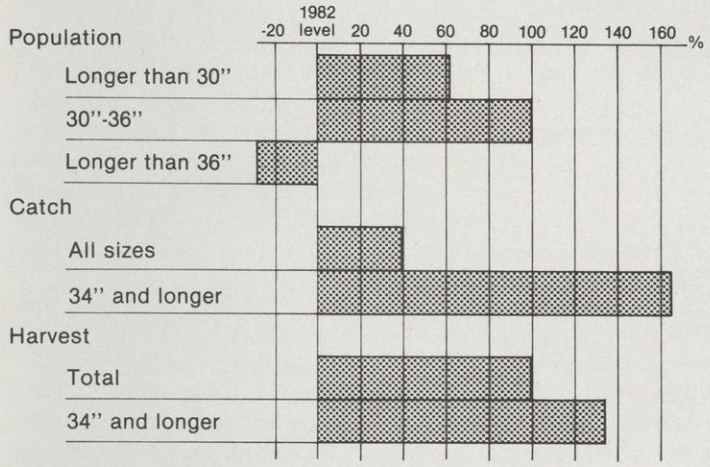
Timber Coulee Creek in Vernon County has a regulation which says that one trout between 14 and 17 inches may be taken and no trout under 14 inches or over 17 inches may be kept. The object is to allow a minimum take of one nice fish while providing good catch-and-release angling for small and large trout.

Catch-and-release is the only fishing method allowed on Castle Rock and Doc Smith creeks in Grant County and on Paradise Springs Creek and Pond in Waukesha County. Since 1977, when catch-and-release started on Castle Rock Creek, the number of brown trout over 13 inches has increased by up to 15 times despite higher fishing pressure. At popular Paradise Springs near Milwaukee, catch-and-release began in 1985 and aims to improve recreational fishing there.

In Bayfield and Lincoln counties, alternate year trout fishing is being tried on nine lakes. The idea is to let stocked fish grow for a year before they're caught. This means bigger fish and more fun catching them. Under normal conditions, most of the stocked fish in these lakes are caught shortly after the season opens and few grow to desirable size. If the technique succeeds, it may be tried elsewhere. Locations where it's being tried are Balsam, Beaver, Little Star, Spring, Blaisdell, Mimi and Nymphia lakes in Bayfield County, and Tahoe and Ament lakes in Lincoln County.

Summary of trout waters where regulations are being evaluated: McGee Lake in Langlade County, South Fork Main Creek in Rusk County, Namekagon River (Town of Lenroot) in Sawyer County, Peshtigo River (Johnson Falls to Spring Rapids) in Marinette County, Wolf River (railroad trestle southwest of Hollister downstream to Dierck's irrigation pond) in Langlade County, Plover River (Totten Springs outlet to County Z) in Marathon County, Willow River in St. Croix County, Castle Rock and Doc Smith creeks in Grant County, Trout Creek in Iowa County, Paradise Springs Creek in Waukesha County and Timber Coulee Creek in Vernon County.

This chart shows the number of brown trout 13 inches and longer per acre in the Castle Rock Creek fish-for-fun area, Grant County. Since 1977, when catch-and-release began on Castle Rock Creek, the number of brown trout over 13 inches has increased many times, despite higher fishing pressure. The downward trend on the graph is due to illegal harvesting. DNR is taking remedial action.



At Bone Lake in Polk county, a 34-inch size limit was instituted in 1983. As a result, the population of those longer than 30 inches rose 60% from 1982 to 1985, while the total number of muskies caught and kept also increased. Musky size limits are being tested on several Wisconsin lakes.

Musky size limits

Trying to reverse a trend toward decreasing average size, in 1983 DNR raised the legal length on muskies from 30 to 32 inches. The effects of this new limit on both anglers and fish are now being studied at Little Arbor Vitae Lake in Vilas County. In a related problem that managers are trying to solve, muskies don't reproduce naturally in high enough numbers to sustain heavy sport fishing. Recent data shows that in some waters most females do not become sexually mature until they reach 33 or even 35 inches. To find out whether it will help, a 34-inch limit is being tested in three locations: Bone Lake in Polk County, Winter Lake in Sawyer County and Big Lake in Vilas County. To make comparisons valid, data was collected on the structure, growth and harvest of the lakes' muskies prior to starting the experiment.

Summary of lakes where musky size limits are being evaluated: Long Lake in Iron County, Bone Lake in Polk County, Lake Winter in Sawyer County and Big Lake and Little Arbor Vitae Lake in Vilas County.

The Northern Highland research lakes

Escanaba, Nebish, Pallette, Spruce and Mystery lakes in Vilas County were set aside for fishery research purposes in 1946. Here, many of the regulations are under constant evaluation. Fishing is allowed by permit only with anglers required to report their catch and effort. The project's length has allowed unique research opportunities and the varied lake types yield a wealth of information. Research has ranged from studies of coho salmon in infertile Pallette Lake to assessing smallmouth bass growth in shallow, boggy Nebish Lake. Population estimates on walleyes have been made at Escanaba Lake for more than 30 years. A large reservoir of other valuable fishery data has been gained from research conducted here.

The lakes were initially chosen for several reasons: their shores were entirely within public ownership so their access could be controlled, they were close to each other and they presented a variety of water quality and habitat representative of other lakes in the north.

Slot size limits on largemouth bass

Slot size limits were instituted to protect bass in the medium size range from harvest. The idea is to let more of the fish grow big enough to become efficient panfish predators. This, in turn, should decrease the number of small panfish and increase the average size of those that are caught. Without predator-sized bass, panfish become overcrowded and stunted and survival of small bass fingerlings is reduced. Slot sizes vary from lake to lake because of differences in growth rates and structure of the individual bass populations.

Summary of waters where slot size is being reviewed:

Kimball, Mueller and Sawyer lakes in Langlade County, Blake and Loveless lakes in Polk County and Wabasso Lake in Vilas County.

Lake trout refuge

Another new idea is the creating of a fish refuge on Trout Lake in Vilas County. This protection should help the lake trout population survive and perhaps grow. In the past 20 years, natural reproduction has gradually decreased and now, even with stocking, relatively few lake trout remain. The refuge covers the entire south basin of Trout Lake. For the time being, the north basin will remain open.

Trout and bass size limits

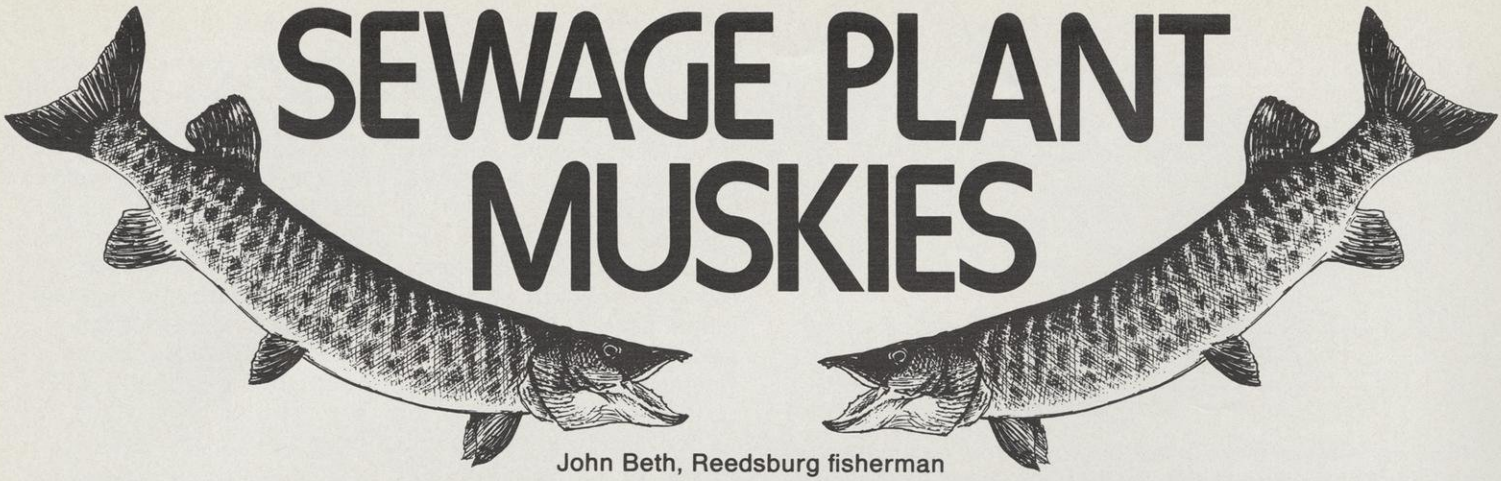
Little Bass Lake in Oneida County and Wildwood Lake in Vilas County both have naturally-reproducing bass populations, but are also stocked with trout to take advantage of the deep, oxygenated waters. A 12-inch limit has been set on both trout and bass to delay harvest and enable fish to grow to a more acceptable size.

Largemouth bass size limits

To try and increase the average size of bass and panfish in the creel, on some waters DNR has prevented anglers from keeping bass that are less than 14 or 16 inches long. Some lakes have too many small panfish and too few good-sized bass to be attractive to anglers. Bass in these lakes are inefficient at controlling panfish abundance. Other lakes have been chemically treated to remove undesirable panfish or rough fish and the reintroduced bass in these waters are in danger of being overharvested before they can become predators that are effective and desirable in size.

Summary of waters where largemouth bass size limits are being evaluated: Park and Silver lakes in Columbia County, Forest Lake in Fond du Lac County, Beckman and Zanders lakes in Green County, Blue Spring Lake in Jefferson County, Little Elkhart Lake in Sheboygan County, Browns Lake in Racine County and Pretty Lake in Waukesha County.

SEWAGE PLANT MUSKIES



John Beth, Reedsburg fisherman

Dedicated anglers create an unlikely nursery for Wisconsin's most famous fish.

Ask any angler in the country what fish they think of when Wisconsin is mentioned and 10 to one it's "Musky!" Our state and that fish are synonymous. They inspire visions of misty northern lakes, cold, dark waters and haunting calls of distant loons. The lure and challenge of the musky hold many devoted anglers in a tight grip.

However, if you mention "sewage plant" in a conversation about muskies, eyebrows would raise and noses wrinkle. But not for a group of folks in the Columbia County city of Portage! There, the sewage plant is synonymous with muskies. And it's a prime example of DNR cooperation with a local club. Just ask Don Schnering.

Don grew up in a small town on the Mississippi River where he guided bass, walleye and northern pike fishing from his family's resort. It wasn't until his move to Portage 10 years ago that he went musky fishing. Some of his new friends took him to a northern Wisconsin lake. It was a once in a lifetime experience! "I caught a 36-inch and a 40-inch musky in the same day, and lost a third," he recalls with a smile. "I'll never forget those powerful fish jumping and fighting. I was impressed for life!"

But sadly, Don's trips up north were few and far between. The distance, need for time off from work and expense meant few outings for Don and many other southern Wisconsin anglers. But circumstances alter cases. "I started thinking about ways to get those great fish a little closer to home," said Don.

On January 6, 1985 a first step was taken when Don became president of the newly formed Portage Area Musky Club. The members had heard of and soon visited a very successful "musky farm" in Wisconsin Rapids. The president of the Rapids area club, John ("Junior") Lapinski had a unique setup—a converted waste treatment plant, once full of sewage, now full of healthy muskies!

John stressed the fact that the tanks were nine feet deep and there was a special aeration system. This kept the muskies in dark water with optimum oxygen. The Rapids club raised hybrids (a musky-northern cross) with the amazing success rate of 98%. Their success rate for true muskies was around 70%—a very respectable number for starting with a 2 1/2-inch fish. For Don and friends the wheels began to turn.

Working with DNR officials they made a co-op deal. The club would provide the place, labor, food and financing to raise the muskies to stocking size of 10 to 12 inches. DNR would provide the 2 1/2-inch hybrid and true muskies at no cost. The way it's worked out, the state is more than pleased with the results and impressed by the club's enthusiasm.

"We think Schnering and his group are great," says Gordy Priegel, DNR's Southern District staff specialist for fisheries at Fitchburg.

When the old Portage waste treatment plant closed in 1982 after DNR helped build a new, more modern facility, the improvement was a move made in heaven for the area's soon-to-be musky farmers. Seven tanks and other structures and equipment were still in fairly good shape. But it took a lot of work! The city cooperated by leasing the abandoned plant to the club for $1 per year. The club obtained the necessary insurance and took on responsibility for the site.

Tons of gravel, clay tiles and equipment had to be removed before construction of what were to become giant aquariums could be finished. The main tank, which holds the true muskies, is 140 feet in diameter and nine feet deep. It can hold a million gallons. There are six other tanks in various stages of reclamation. Two of them are still buried. This facility could some day produce 400,000 muskies a season when in full working order and running at capacity. The club also plans to raise other game fish for area lakes, if possible. "Right now we are just thankful to be operational and established," Don says.

The support and input has been tremendous. "All of this, with few exceptions, has been done by volunteer labor and equipment," Don points out. "I am thrilled with the way people have worked so hard so we can all realize this dream together." Other musky clubs in the state have helped this one get on its feet, but the costs of rearing muskies is high and initial investment costly.

Some 2,000 feet of pipe have been installed for the numerous air and water lines that supply the tanks. About 100 gallons of water per minute come in from the nearby Fox River. The special air supply for the three tanks now in use is pumped through a series of small pipes, then comes out a "T" opening where it filters through rocks to break up the bubbles. This makes for better absorption of oxygen into the water and has a circulation effect. Optimum for good musky growth is five to 12 parts per million (ppm) of dissolved oxygen.

The plant is only a short walk from the Fox River and with no upstream discharges, water quality is good. Tank temperature is kept in the 65 to 75 degree range.

The 6,500 hybrids in the small tank are fed a high protein pellet similar to those hatchery trout eat. Hybrids do well on this. True muskies, on the other hand, are

Volunteers from the Portage Area Musky Club get the big tank—140-by-9-feet—ready to accept fish. Photo by Don Schnering

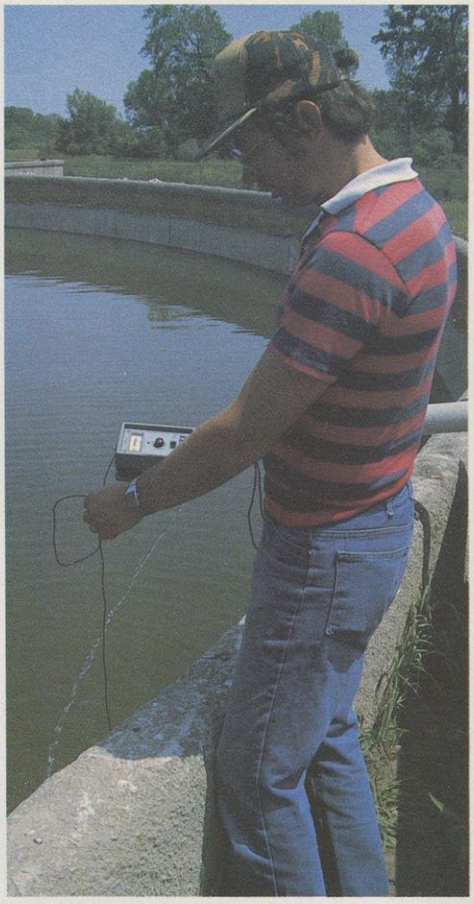
instinctive predators. They need live fish to survive. If they don't get enough or the right size, they eat each other. A musky farmer's nightmare! They're true hunters even when only a couple inches long and eat an amazing amount of food.

"We start our 3,000 true muskies on 150 pounds of small fathead minnows per week. As the size of the musky increases, so does the food size and the supply needed," Don says. "They can eat you into the poor house!" This fact along with other concerns make it a very expensive game fish to produce.

"We start raising fathead minnows in May in the big tank. Along with zooplankton that come in from the Fox River water, we grind up food pellets and feed that to the fatheads to put some growth on them," Don says. The minnows spawn on small clay tiles in the tank bottom. Fatheads spawn several times a season, a big plus when there's a hungry population of true baby muskies ready to arrive. The club plans additions in the near future to its fathead cafeteria on the 3 1/2 acre site.

Installing the water pump intake structure on the Fox River. Photo by Don Schnering

The special air supply for the three tanks now in use is pumped through a series of small pipes. Photo by John Beth



Don Schnering does a water temperature check. Photo by John Beth

It takes about two months for the 6,500 hybrid muskies to grow 10 inches long. The 3,000 true muskies grow to 12 inches in that time. Then comes a decision on where best to stock the young fish. It's made by the club and the DNR fisheries specialist based on studies of various fish populations. Southern Wisconsin lakes are the likely beneficiaries, especially those plagued by over-abundant stunted panfish.

While most dyed-in-the-wool musky anglers prefer the true musky, hybrids are easier to catch, cheaper to produce and also grow to an impressive size. The record is over 50 lbs. "Any angler hopes for a true musky, but we'll settle for hybrids, thankfully!" Don says.

You may start catching the Portage Club's fish sooner than you think. Stocked at 10 to 12 inches, it typically takes three fishing seasons for a hybrid and four or five seasons for a true musky to reach the legal mark of 32 inches. Even though the first 32 inchers from the Portage Club won't show until 1988, it's likely that between now and then, you might catch an undersized one. If you do, it's your job to help to ensure that those little muskies grow up to be legal-sized big muskies—the kind we all want to catch.

Careful release of sub-legal fish should be done quickly and with as little handling as possible. Revive the fish if need be, but postpone any "hold-it-up" pictures for a keeper. Remember that bait-caught fish are often deeply hooked, so don't horse it around. Cut the line promptly. Artificial lures increase a fish's chance to live and our chance to catch a real trophy in the future.

Signs posted at newly stocked lakes can help anglers distinguish between the true and hybrid musky and the sometimes confusing look-alike northern. Remember, the difference between keeping a 30-inch northern and a 30-inch musky is a lot. It could be foolish and expensive!

Even though the Portage Club and others like it are doing excellent work in helping bring muskies to southern lakes, I know there are still a few folks out there muttering "it's not the same as real up-north musky fishing." To them I say, how'd you like to have to go to Scotland to catch your next brown trout, to Oregon for your next chinook or to the Orient to bag a ringneck pheasant? Besides, if we spread out the fishing pressure, it's apt to give us all a little more of that much sought-after space we all seek in the wild.

The Portage Area Musky Club (Box 840, Portage, Wisconsin 53901) does all its work with only 100 members and annual dues of $20.

"We aren't a social organization, we're a working club," says Don. "If anyone has any specific questions or if there's a group, or whatever, that would like to see our operation or like to help us out, they can call me at home at 608-742-6352. We plan to get into other species if all goes well."

The club has had a few problems with equipment and such, but in their leader's words, "We're learning all the time and as problems come up we puzzle them out together. We'll make it work. It's our pride and joy."

DNR will deliver this season's quota of baby fish to the reborn sewage plant late this spring. The fish will be a double symbol—of a state species, and also of DNR's faith in the tenacity, ambition, effort and achievement of the Portage Musky Club. Down the line, when you boat one of these muskies, you can thank groups like the Portage club. They help make fishing in Wisconsin the best in the Midwest.

Venerable boats of the line:

the Hack Noyes & the Barney Devine

Rick Mulhern, DNR Public Information

Rejuvenated sentinels of Wisconsin's inland seas serve on.

Two of DNR's hardest workers marked 40th and 50th birthdays recently. There was no party: instead friends observed the event with special memories and affectionate feelings.

The hard workers, strangely enough, are a couple of boats, the Barney Devine and the Hack Noyes. The Barney was built 50 years ago, the Hack 40.

The Hack is a 55-footer, originally built for commercial fishing, and now used by DNR for fish research on Lake Superior. She's based in Bayfield. The Barney, a 50-footer, was originally employed as a gill net tug by a Michigan fisherman. She's based in Sturgeon Bay, and used for research on Lake Michigan.

Among those paying tribute to the boats are their past and present captains and crew. Orville Weborg was a crewman on the Barney from 1943 to 1951 and captain of the Hack from 1951 to 1970. "It's fitting that the Barney and the Hack get a little recognition," says Weborg, a retired DNR warden. "They're good, seaworthy boats that have logged many miles for the state in many kinds of weather."

The Barney has been under the direction of DNR's Fish Management Bureau since 1969. The boat helps assess populations of lake trout, perch, walleye, whitefish, salmon, chubs and other Lake Michigan species. Sometimes she assists wardens when they have to seize illegal gill nets, or aids university researchers in lake trout and sediment studies. The Hack went to Fish Management in 1970, and does similar work on Lake Superior. Like the Barney, the Hack started service in Law Enforcement.

The Barney Devine, on the lookout for illegal commercial fishing on Lake Michigan in the 1940s. Photo courtesy of *The Fisherman*

Both vessels have a colorful history.

The Barney, originally named the Albert J., was built in 1937 by the Burger Boat Co. of Manitowoc for a Michigan fisherman. The Albert J. was a formidable vessel—steel-hulled and crafted to withstand winter operation.

She was purchased by the old Wisconsin Conservation Department (WCD), DNR's predecessor, for $8,500. WCD needed a patrol boat to help keep tabs on commercial fishing, to check nets and enforce Lake Michigan's conservation laws. WCD christened her the Barney Devine in honor of the department's late chief warden. Originally stationed at Sheboygan, she was moved to Kewaunee in 1947.

The boat represented a quantum leap for WCD law enforcement capability at a time when violations were rampant. A 1944 issue of *The Fisherman* magazine put it this way:

"Her first voyage for the state resulted in confiscating a string of gill nets which were illegal in depth and mesh size. Since her maiden trip, the Barney, as she is affectionately called by her crew, has confiscated several hundred thousand feet of illegal nets, mostly chub nets."

During the 1940s and 50s, trout and chubs were abundant in Lake Michigan, but nets commercial fishermen used to catch them weren't always marked with buoys as required by law. Some chub fishermen were notorious for using nets with mesh smaller than the required 2.5 inches, or nets deeper than the maximum 35 meshes. Everywhere, it seemed, miles and miles of illegal nets were strung.

Today, the Hack Noyes is a seaworthy tool for DNR's Fish Management Bureau. Crewmen (from left) Mike Andrews, Scott Hulse, Capt. Laurie Nourse and Jim Ludack in a 1982 pose. Photo by G.D. Westman

The "Hack" was named after Haskell P. Noyes, chairman of the Wisconsin Conservation Commission from 1931 to 1933.

The Barney hunted them down with drag hooks, then winched them into the hold. Often it stayed on the lake for a week at a time.

Retired Warden Don Euers served as a crewman on the Barney and was her captain during the '40s and '50s. "I probably couldn't tell you how many illegal nets were being operated out there," Euers says. "But commercial fishing boats carried boxes of nets, each box containing 1,200 to 1,300 feet. There were times we'd get 30 boxes, 50 boxes.

"Sometimes the fishermen who were cheating were pretty bitter when caught. There was a bunch that used to work the Two Rivers area, another that worked around Washington Island near Door County. Illinois fishermen would come up during our closed season and set up across the state line at Kenosha.

"The commercial fishing laws hadn't really been enforced before the Barney came along. Now we were out there confiscating nets. The Barney didn't make too many friends outside of her crew."

Once, while the Barney was seizing nets north of Manitowoc, a commercial fishing boat dropped a drag hook into them and tried to yank them away.

One night a state shed that was used to store nets at Kewaunee was burned to the ground in retaliation.

A newspaper story from the early 1950s tells how the Barney returned from patrol off Washington Island with a tremendous haul of nets. "The Barney came in early this morning with 50,000 feet of illegal chub nets valued at more than $4,000," the article says. "This is the largest confiscation of illegal fishing gear since the seizure of 50 boxes of nets in the same area six years ago."

There was a time when the entire first floor of the old state fish hatchery in Sheboygan (where a YMCA stands today) was filled with confiscated fishnets.

"Many were taken there and put on drying reels," Euers says. "The reels looked like big spindles with several crossarms about eight feet long."

Nets had to be handled with care because courts sometimes ordered them returned and if damaged, WCD was liable. Confiscated nets were sold if they were of legal size. Others were burned.

What of the tons of illegal fish the Barney hauled in with the nets? Those that were alive were released, those that weren't were sold to dealers.

"At one time, the chubs sold for a nickel a pound," Euers says.

When WCD purchased the Barney, she was already well-fitted for patrol work. A radio compass and a ship-to-shore telephone were installed. A galley was also added and the cabin and pilothouse insulated to make things bearable in real cold. The boat was a capable icebreaker and often plowed through foot-deep, hard, blue ice.

First captain of the Barney was George Hadland, who later became chief warden. Other captains were Arthur Odau, Albert Wilke and Frank Schmidt.

By 1969 the old WCD had evolved into the Department of Natural Resources. Commercial fishing had declined and law enforcement needed something speedier. The Barney Devine began a new career.

She was replaced in law enforcement by another boat, transferred to fish management, and her port city shifted to Sturgeon Bay. In 1972 the Barney was repowered with a new diesel engine, the pilothouse was redesigned and most of the equipment on board modernized. Today the boat features the latest electronic gear—autopilot, sonic depth finder, radar and marine radio. She's used to plant fingerlings and fry, to conduct research on Green Bay and Lake Michigan, and to do pollution studies. Her pilot is Richard Pagel.

On Lake Superior, meantime, the Hack Noyes has written her own success story. The Hack was built by Burger Boat in Manitowoc about 40 years ago and turned over to new owner Henry Smith, a commercial fisherman from Waukegan, Illinois.

The Helen Jean, as the boat was first called, began serving the State of Wisconsin in 1951. That's because Waukegan had decided to clear its waterfront area and Smith had put the boat up for sale, along with his fish market and fishing gear. The state bought the boat for $17,000, moved her to Bayfield, and named her after Haskell P. Noyes, a former head of the Wisconsin Conservation Commission. Bunks, cupboards, a refrigerator and other equipment were added.

"It was our job to enforce the commercial fishing regulations on Lake Superior," says retired Captain Weborg. "In a way the regulations were a lot like traffic signs. With no enforcement around, it was more likely they'd be disobeyed.

"But we'd also lend a hand to the commercial fishermen if they were in trouble. Our patrol territory stretched about 40 miles south of Bayfield, about 40 miles northeast of Bayfield, and about 85 miles north to Superior. I can remember the day we rescued a commercial fishing boat that was stranded about 40 miles out in the lake. In spring, we helped break up a lot of ice for them."

In addition to fisheries enforcement, the Hack helped with wildlife work in the Apostle Islands, assisting with deer research and pine marten stocking.

There were also chores for the US Coast Guard. "We made a lot of rescues," Weborg says. "I remember one run to the outer Apostle Islands, when we helped a person who'd broken his back. If fire broke out on one of the islands, we'd go in with a small boat off the Hack and fight the flames. We'd also help tow disabled vessels back from the islands—sometimes the Coast Guard was short on equipment or manpower.

"At one time, a man and woman were trying to live off the fruits of the land on Stockton Island. We'd pass by to check on them and make sure they were OK."

Many wide-eyed schoolchildren came aboard the Hack for educational tours of the boat. The Hack's crew also helped carry out water quality checks on the lake. In the late 1960s, one of the boat's missions was to help study the extent of taconite tailings from the Wisconsin/Minnesota state line to Sand Island, about 75 miles. The tailings were a crystalline fiber asbestos contaminant, a by-product of the taconite production process. The pellets were produced by a Minnesota firm and there was concern that

the tailings could pose health risks.

"I was surprised at what we learned," Weborg says. "As part of the study we'd lower a bucket every three or four miles to sample the lake bottom. The tailings must have been two inches thick down there. We had to attach a 500-pound weight to the bucket to get it to penetrate the tailings."

When the Hack first went into operation out of Bayfield, whitefish, herring and trout were plentiful in the lake. "One of the first places we found commercial fishing violators was over by the Brule River," Weborg says. "There were big numbers of people. On another of our first runs we turned up a huge gang of illegal nets about 30 miles from Superior.

"From then on we seemed to run into just about every commercial fishing violation possible. Some fishermen were doing pretty well what they pleased."

One bust turned up 25,000 feet of illegal netting—$2,000 worth.

"We had a number of methods for tracking down violators," Weborg says. "Sometimes we'd get tips from informers, or we'd do spot checks. Many violators turned up during routine patrols we'd perform at certain times of the year."

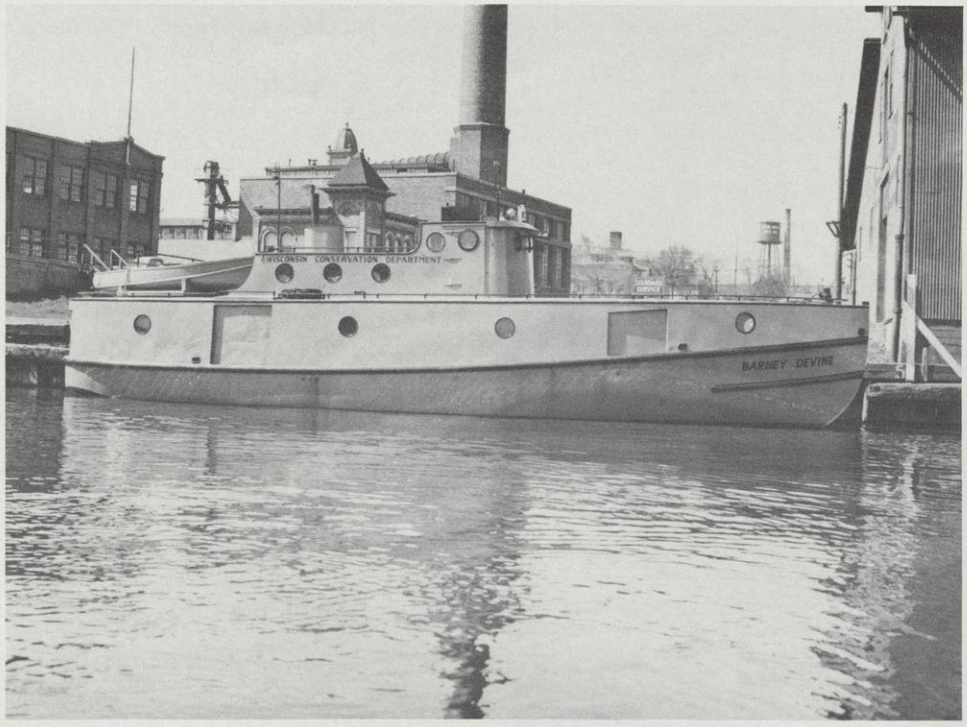
In an interesting twist, Lake Superior violators reacted much differently to arrest than their Lake Michigan cousins, Weborg says. "It was like night and day. You could usually anticipate some trouble with the Lake Michigan people. Not so with the Lake Superior fellows. I remember arresting one fisherman on Lake Superior for brown trout violations. You know, when he got out of court, he actually came up to me and apologized for the infraction. That type of behavior was the rule."

Nets captured from Lake Superior were either sold or destroyed, depending on court rulings. Illegal nets were cut up, leads and floats removed from the nets, and the floats sold.

"When we confiscated nets, we'd sometimes bring in a pretty good load of fish, too," Weborg says. "The fish were sold for market price."

In 1970, after two decades in law enforcement, the Hack was replaced by another boat and transferred to fish management. Refitted with a new engine, an assortment of research apparatus, a new pilothouse, new generator and new wiring, her work on Lake Superior fishery problems has evolved from enforcement to management.

Through the years a number of captains have piloted the Hack. Laurie Nourse Jr. has held the job since 1979. He was preceded by William "Bud" Bodin, who came on board in 1970. Prior to that it was Weborg.



The Barney Devine at her original station, Sheboygan, in 1943. Sheboygan Press photo

Today the boat works from ice-out to freeze-up on research that includes chubs, herring, lake trout, whitefish, walleye, smelt, brown trout and splake.

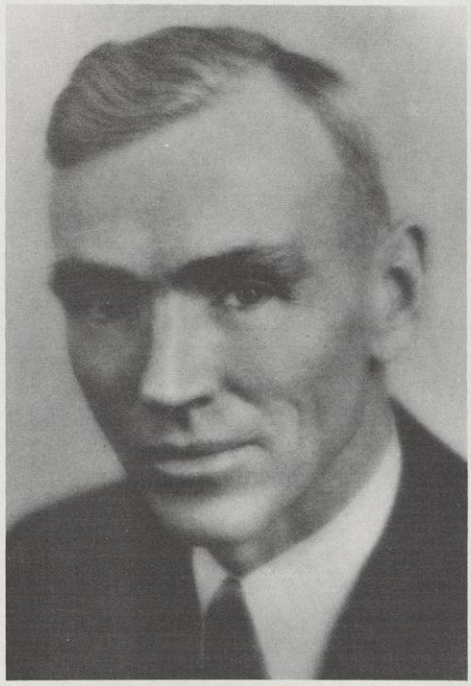
Like the Barney, the Hack carries a highly respected research crew. Both boats have done important work on lake trout rehabilitation. And looking forward, it appears that both will remain on duty for many years to come.

Mark Holey, DNR fisheries biologist on Lake Michigan says the Barney's hull is still in good shape.

"The boat's been invaluable for us," says Holey. "It's economical—operating cost is maybe $19 an hour. And it broadens our range of capabilities. There are times you can contract with commercial fishermen to get a boat for a project, and times you can't. There are some surveys you can do only if you have your own boat and can make the time commitment."

The Hack, for its part, "will be going a long time yet," says Bruce Swanson, DNR's Brule area fisheries coordinator. "The boat's well-built, and her engine's of a type that gets low wear and tear. She's economical and the kind of programs she's used for are growing more and more valuable—the monitoring of forage fish and of spawning, for example.

Says Weborg, "It's good to know the Hack and the Barney will be around awhile. In their own way, they made a big contribution to straightening out the commercial fishing business. And those boats are like old friends to me—I'd hate to see them go."



Barney Devine, chief warden for the old Wisconsin Conservation Department.

How to fish:

the DNR lesson plan

Ron Poff, Chief, Inland Fisheries

For people who never caught a fish, worms, nightcrawlers and other kinds of live bait are gooey, slimy, slippery and maybe even disgusting. To put one on a hook is pretty yukky. Instead of fishing, better try a water slide, movie, Great America or the Indy 500.

With changing times, that's one of the problems faced by DNR fish managers. Today, there are a lot of people who never caught a fish. A generation or two ago, angling was a routine part of family fun. Today, it's often a skipped option. And DNR's fish managers want to change that.

They've identified a whole list of nontraditional "client groups" to receive the message. These clients include not only urban dwellers and single parent families, but also the mobility impaired, Native Americans and others, especially kids.

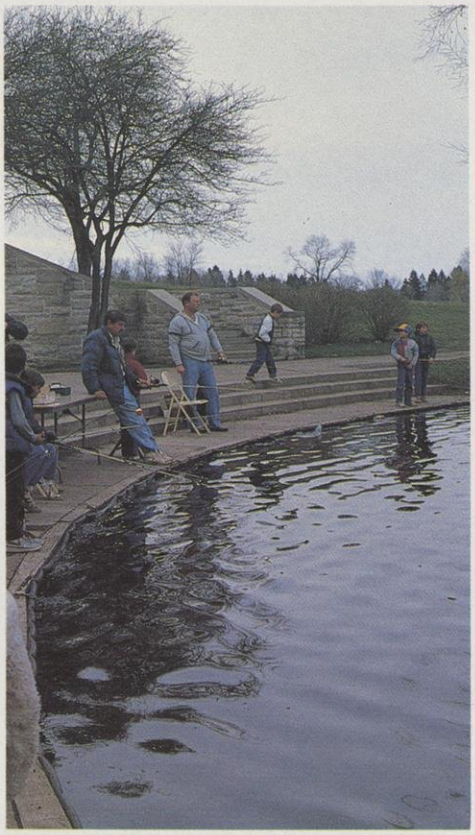
The idea is to educate them: about the six strategies in "Fish Wisconsin 2000" (see centerfold pullout poster); about how resource protection and appreciation are critical to survival of sport fishing in Wisconsin and about how to fish.

While these nontraditional client groups have a definite place in DNR's resource management program, it may be difficult to make contact with the message. That's because these groups are not as well organized as DNR's older clients and often have activity goals and directions other than fishing and aquatic resources.

To get an ongoing dialogue started, the Bureau of Fish Management has started a new Aquatic Resources Education Program (AREP). Seventy-five per cent of the funding will come from the Federal Aid in Sport Fish Restoration Act.

Part of AREP will focus on kids and fishing. Youngsters from both new and old client groups will participate. AREP will use professional fish managers, sport fishermen and volunteers as teachers. The overall goal will be to impart a strong sense of environmental protection and resource management. A priority will be to help form strong ideals and principles about fisheries and fish management in youngsters.

If you've never caught a fish, but want to, get in on DNR's Aquatic Resource Education Program.



Today there are a lot of people who've never caught a fish, but DNR hopes to change that through its Aquatic Resources Education Program. Photo by Allen Stenstrup

AREP will be operational by 1990. A main feature will be public participation in planning and evaluation through an Aquatic Resources Education Advisory Committee. The committee will consist of educators and representatives of key user groups and other state programs whose activities relate to fish management. It will advise DNR on how to reach all necessary clients and how best to deliver the message.

A new Project Wild program on aquatic resources will be introduced to the curriculum of public and private schools for kindergarten through 12th grade. No fishing skills will be taught in this part of the program, which will emphasize aquatic life forms, habitat requirements and the significance of a clean aquatic environment.

A separate fishing skills clinic will be developed. Trained volunteers will teach people of all ages how and where to fish. Urban children and teens will be especially targeted. They will learn about sport fishing's dependence on high-quality aquatic resources and appreciation for Wisconsin's varied fisheries. The clinics will give people interested in sport fishing an opportunity to volunteer as instructors. Certificates will probably be awarded for successful achievement.

An extensive library of teaching aids will be developed to include printed, audio-visual and graphic materials. These will inform new anglers about the state's diverse and abundant fisheries—where they are, how good they are, and how they can be experienced.

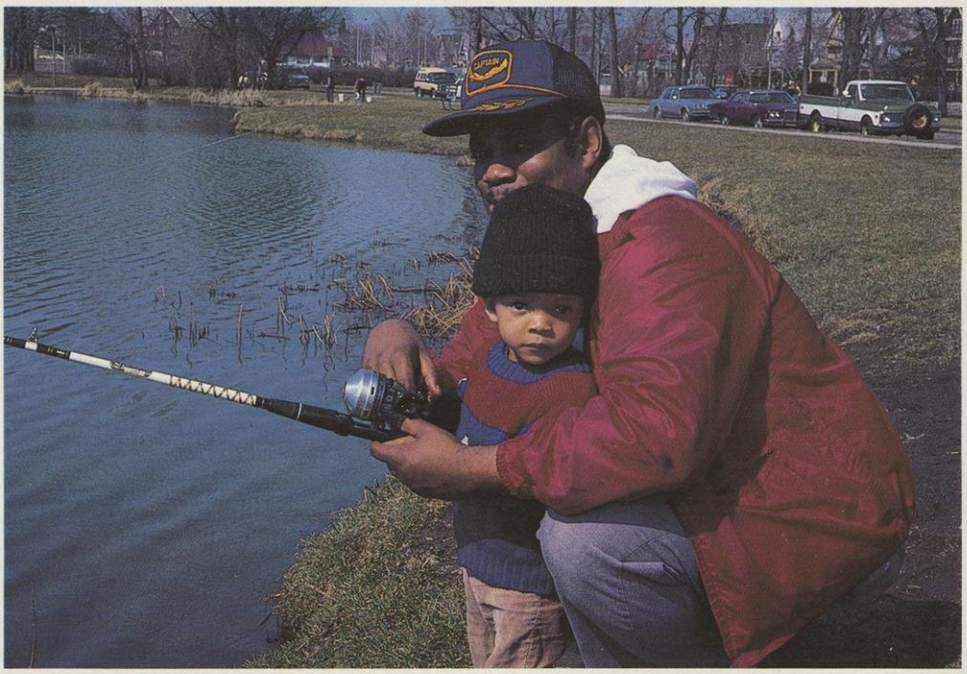
A special adult education program will be developed. As part of it, a trained team of DNR professionals will establish prototype fish management "showcase" projects. The projects will demonstrate and teach fish management techniques, on-site, to angling clubs, community

groups, lake property owners, farmers and other interested parties. This will let the public become directly involved in fish management, which can then be expanded to cover many more waters than the state can now afford. Adult workshops, courses and lectures on involvement in fish management programs will also be held.

And finally, AREP will emphasize one particular "Fish Wisconsin 2000" goal: that those who enjoy fishing now will be assured they can continue to do so in the future.

A kind of preview of the new program will come on June 20th. On that day, prospective anglers will be invited to a special open house at all state parks and to free fishing clinics at several of them. No fishing licenses or parks stickers will be required on that day in any of the state parks. Volunteer instructors from nearby fishing clubs will tell about the park's fisheries, what's being done to protect and develop them, the fishing rules, how to catch fish and the proper care and preparation of a catch.

You're invited. Please come!



A separate fishing skills clinic will be developed and trained volunteers will teach people of all ages how and where to fish. Photo by Allen Stenstrup

A priority of the fisheries education program will be to help form strong ideals and principles about fisheries and fish management in youngsters. Photo by James W. McLean Associates Ltd.

Adult workshops, courses and lectures on involvement in fish management programs will also be held.

Tell me about the good old days

Terry Margenau, DNR Fisheries Research

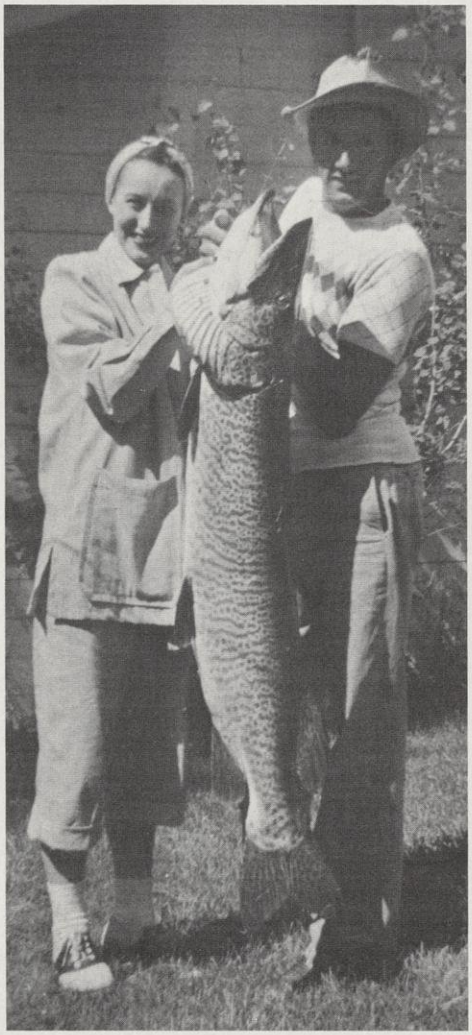
Fishing really was great back then, but it's not bad now. Old records could topple in the future with a little catch-and-release help today.

Probably just about every one of us has, at one time or another, heard someone tell about how good fishing was in "the good old days" — back in the 40s and 50s. Stories are passed along from one generation to the next about limits of eight and 12 pound walleye, huge 20 to 30 pound northerns, monster bass, and of course, muskellunge the size of your boat. I'm pretty sure some I've heard are just stories, but I'm also certain a lot of those stories are true. As a matter of fact, I'm reminded of how good things were back in the good old days every time I'm at a resort or bait shop and see one of those giants of the past hanging on the wall. And it's almost always a sure thing that while I'm gazing intently at the mounted relic, somebody who has experienced that fabulous fishing era will step up behind me and say with a sigh, "Ah, ya just can't catch'em like that anymore."

When talking about angling of the past, I notice a couple of generic questions usually seem to surface: Has the quality of fishing really changed that much? Can the records of yesteryear ever be erased, or are they immortal and just a dream for modern day anglers? And what about the future?

Predator-Prey Relationships

To address the subject of quality fishing, the first item that needs to be discussed is the angler. (Let's call him the predator.) To start with, there are a lot more of them (anglers) today than there were 40 years ago, both residents and nonresidents. People have really taken a liking to the sport of angling. Since 1947, the number of Wisconsin residents enjoying fishing has increased an estimated 75%, from just over a half million to over 1 million. Nonresident anglers also enjoy Wisconsin fishing, indicated by a 98% increase in numbers from 1947 to 1986 (from 250,000 to over 500,000). Now I've never been too good at math, but the figures here seem to suggest there are about twice as many anglers out casting a daredevil or jigging a leech today as there were back in the good old days.



The good ol' days produced their share of big-time musky.

Next, let's consider the fish (the *prey*). Most people don't realize just how long it takes to grow a decent sized walleye, northern, bass or musky. I know I was a bit shocked when I first found out that on the average (statewide) it takes six to seven years for a walleye to grow to 18 inches, a northern pike to reach 25 inches, a bass to measure 16 inches and a muskellunge to hit the legal size of 32 inches. If we go one step further and consider the time required to grow trophy-sized fish—walleye 30 inches, northern pike 40 inches, bass 19 inches, and muskellunge 45 inches—we are looking at a minimum time span of 12 years!

In a dog eat dog (or fish eat fish) world, 12 years is a long time to avoid becoming the meal of something in the aquatic environment. If we add to that twice as many top level predators (the angler) as were on the lakes in the 40s and 50s, it doesn't take a market analyst to realize that without some control, Wisconsin's fish populations will suffer from a supply-demand crunch.

Well, with angling becoming such a popular pastime and the way technology is advancing to facilitate fishing's every need, it would seem the road ahead is quite a bumpy one for our aquatic heroes (the fish).

But wait! Maybe we haven't taken a close enough look at today's fishing and

the anglers who do it. As a matter of fact, fishing has been pretty darn good in recent years, if it's record size we're going by. When I looked through the official list (January 1, 1987), I counted 23 records that had been broken or tied since 1980. That figures out to about 43% of all the records ever established for various fish species. That's pretty good, but the trained eye will notice that a few of the more popular inland game fish records have been untouched since the "good old days": walleye (1933), northern pike (1959), muskellunge (1949), and largemouth bass (1940). Remember, these are the same four species I gave some growth rate information about a little earlier. If we're talking about at least 12 years to produce a trophy sized fish, imagine what it would take in addition to those 12 years to have one of those record fish out there somewhere swimming around in your favorite lake.

Catch-and-Release . . . "Catch the Fever"

The practice of catch-and-release has become increasingly popular over the past several years, and in my opinion is the solution which will produce record sized fish in the face of an increasing number of anglers. In one particular study in Polk County, a creel survey found that musky anglers were releasing over 70% of the fish they caught. It's also been shown that with proper handling, the survival of released fish is high. In other words, the fish you catch-and-release this summer or next winter has a chance of being the fish that someone else will catch several years from now, and maybe then it will be a trophy or new state record.

Now, don't get me wrong . . . I certainly don't think there's anything wrong with taking a fish home to eat. I like the taste of fish just as much as the next person. But, consider this as an example:

While ice fishing, you catch a 29-inch (5 1/2 pound) northern pike. A nice fish no doubt—but you fish a lot and have caught many pike larger than this, so it's certainly not your biggest. (This fish is probably in the neighborhood of eight years old.) So you decide to release the fish (of course after you get a quick snapshot so you can show the guys at work).

Two years later, you're fishing the same lake again with your neighbor and his seven-year-old daughter. The young girl and her dad don't have the opportunity very often, so you're hoping to show them some good fishing. Well, as things go, it was very slow (barometer must have been low), and at 2 pm you haven't even had a bite.

But finally, at 3:15 there's a flag. The young girl takes it, and after quite a battle and some expert coaching from you—a 35 1/2 inch, 15 pound northern lay on the ice.

In all the excitement, you can't help but notice that this fish has a distinct scar along its back near the dorsal fin . . . the same mark that a fish you released two years ago had. A feeling of deep satisfaction comes over you as you see the excitement on the girl's face for you realize that if you had not released that fish two years ago, this whole experience would never have happened.

Obviously, every fish that's released will not grow to become a trophy or state record, but some will, and that's what's important. You know, now that I think of it, there were rumors around this part of the state last winter that a fisherman had "something enormous" attack a six-pound northern pike just as he was about to bring it through the ice. As the story goes, this "monster" left marks on the six-pound fish which when measured indicated a jaw spread of eight inches. Without a doubt this fish would have put the present Wisconsin northern pike record (38 pounds) into serious jeopardy. I wonder if that "monster" was released a few years back by some angler? Maybe you?

The Future

If catch-and-release becomes popular in Wisconsin, and there seems to be every indication it will, I'd be willing to bet within the next 10 years some of Wisconsin's longtime game fish records will be shattered.

As for the good old days—well, they were undoubtedly as good as everybody says and anyone who challenges that notion is no less than a fool. But fishing has changed. Angling technology is vastly better, more people talk fishing and it's all over the media. Both you and DNR understand management details a lot better and all this awareness means that our precious fishery resource is in good hands.

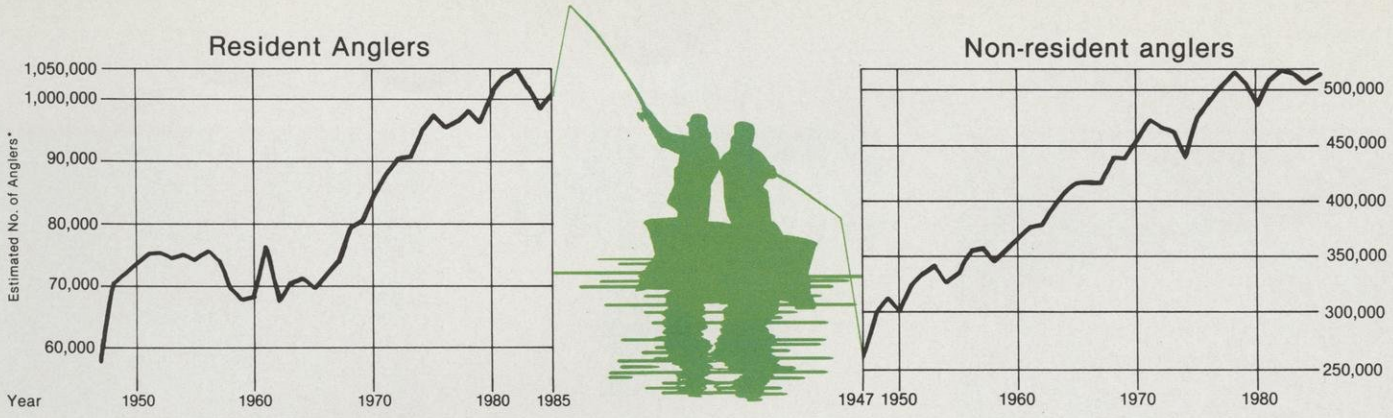
I bought my son, who at this writing is eight months old, his first tip-up last Christmas in hopes that someday he will enjoy fishing as much as his dad does, and his grandfather did in the good old days. Maybe someday while we're out fishing, he'll hook into a trophy (maybe a state record) and as we're admiring the fish I'll notice the distinct marking of a fish *I released* the year I wrote this article. To me I guess that's what it's all about. So come on, join in and CATCH THE FEVER—release some fish.

As of January 1, 1987
Freshwater Angling Records

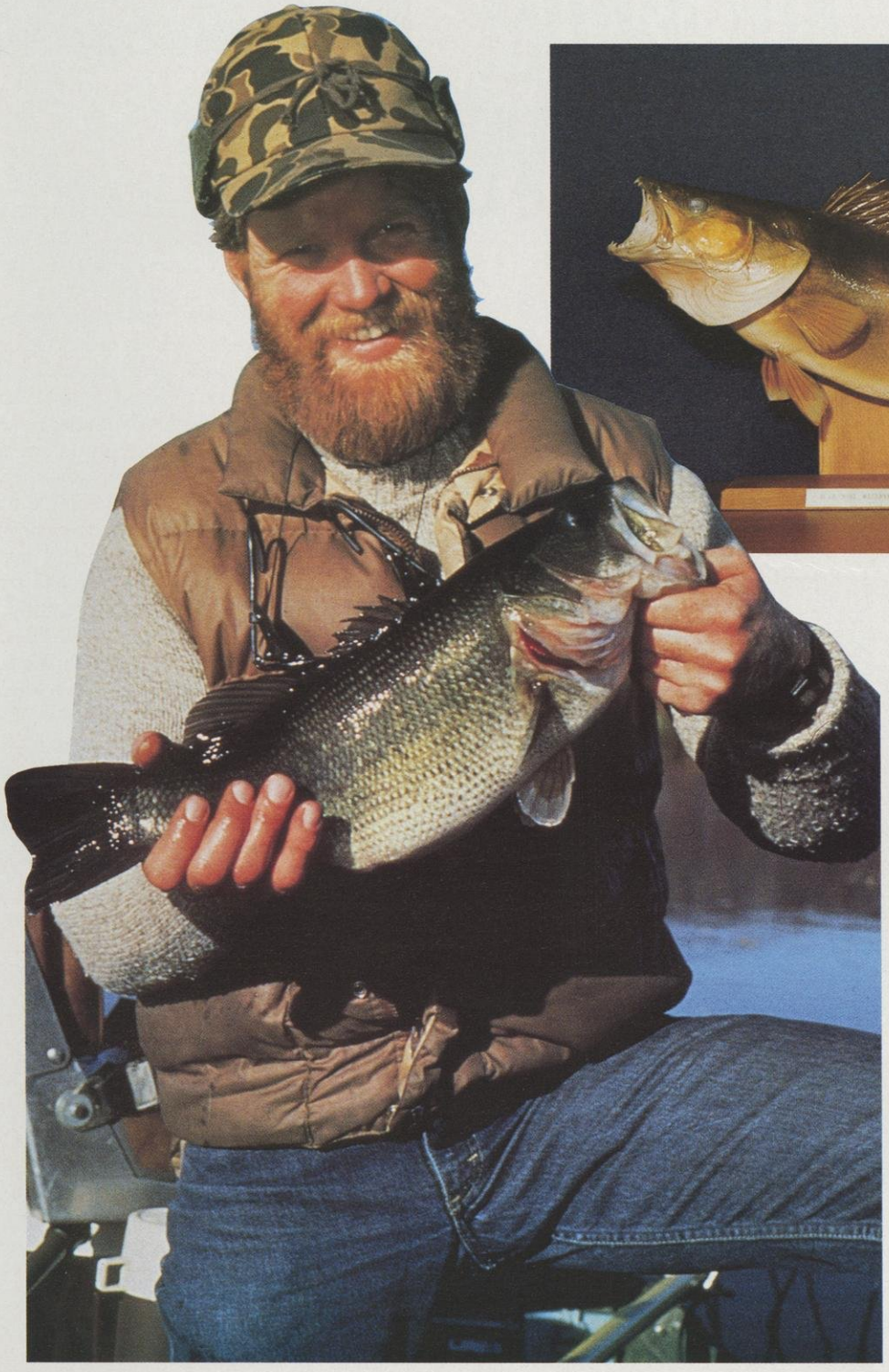
WISCONSIN'S RECORD FISH

Species	Weight lbs	Weight oz	Date Caught
Bass (Largemouth)	11	3	10/12/40
Bass (Smallmouth)	9	1	06/21/50
Bass (Rock)	2	0	05/28/83
Bass (Hybrid Striped)	11	2¾	07/29/84
Bass (White)	4	6	09/24/77
Bass (Yellow)	2	2	01/18/72
Bluegill	2	6	01/18/72
Bowfin	13	1	07/19/80
Buffalo (Bigmouth)			
(Hook/line)	35	5	11/26/78
(Spearing)	60	0	04/27/82
Bullhead (Black)	2	14	07/08/78
Bullhead (Brown)	3	12	07/31/72
Bullhead (Yellow)*	3	5	06/06/83
Burbot	11	15	02/10/80
Carp*	57	2	08/28/66
Catfish (Channel)	44	0	1962
Catfish (Flathead)	65	0	04/19/87
Cisco*	4	10	06/12/69
Crappie (Black)	3	6	04/29/85
Crappie (White)	4	8	08/12/67
Gar (Longnose)	12	10	05/13/86
Gar (Shortnose)	0	15	09/14/82
Gizzard Shad	4	4	02/10/82
Mooneye	1	6	12/26/81
Muskellunge	69	11	01/20/49
Muskellunge (Hybrid)*	51	3	07/16/19
Northern Pike	38	0	08/06/52
Perch (Yellow)	3	4	1954
Pumpkinseed	1	0	01/15/76
	1	0	05/09/82
Redhorse	11	7	05/29/85
Sauger	5	5½	02/11/79
Salmon (Atlantic)	23	15	07/18/80
Salmon (Coho)	24	6	08/17/75
Salmon (Chinook)	43	3	08/25/83
Salmon (Kokanee)	0	12	09/19/84
Salmon (Pink)	4	7	09/25/83
	4	7	08/22/86
Sheepshead	35	2	06/18/83
Lake Sturgeon (Hook & Line)*	170	10	09/22/79
Lake Sturgeon (Spearing) (Pokegama L.)	195	0	05/20/79
Lake Sturgeon (Spearing) (L. Winnebago)	180	0	1953
Sucker (White)*	5	15	07/11/79
Sunfish (Green)	1	9	08/23/67
Trout (Brook)	9	15	09/02/44
Trout (Brown)	32	8	08/23/78
(Inland)	18	6	05/07/84
Trout (Lake)	47	0	09/09/46
(Inland Lake)	35	4	06/01/57
Trout (Rainbow)	24	4	08/19/73
Trout (Splake-Hybrid)	14	4	06/07/67
Trout (Tiger)*	20	13	08/12/78
Walleye	18	0	09/16/33
Warmouth	0	11	08/20/83
Whitefish (Lake)	11	11	05/07/77

*Wisconsin record is also world record.



*Estimated from number of fishing license sales



Modern times still provide plenty of trophy potential as these photos demonstrate: above is an 11-pound, four-ounce walleye and to the left fisheries staff specialist Mike Talbot displays a trophy largemouth bass.

TRY STOCKING YOUR AQUARIUM WITH NATIVES

Mottled sculpin.
Photos this page by Konrad Schmidt

Rainbow darter.

Konrad and Mary Schmidt

A mottled sculpin from the creek down the road can be more fun than a guppy or a tetra.

Most of us at some time in our lives have kept tropical fish or known someone involved in this very popular hobby. The variety of species to choose from seems almost unlimited and ranges from intensely colored jewels to uniquely bizarre conversation pieces. These fish also have the additional fascination of coming from exotic locations like the Amazon River of South America or the Rift Valley in Africa. With that kind of hype going for tropical fish, it's not surprising that few fanciers ever consider species found in Wisconsin lakes and streams. In fact, most people think that it's too difficult to do or that it's not allowed. Neither is true. Many of the fish from the creek down the road are just as fascinating as their tropical counterparts and even provide a few fringe benefits.

Although Wisconsin can't compete with the tropics in number of species, we have a respectable assortment. Approximately 150 kinds of fish inhabit Wisconsin waters. Most are natives, but a few such as the brown trout, carp and sea lamprey were introduced either accidentally or intentionally. The best candidates for aquariums are the non-game species. Many are very common and generally easier to keep than tropical fish. A few such as the aptly named northern redbelly dace, orangespotted sunfish, and rainbow darter can rival the colors displayed by many of the "imports." At the other end of the spectrum, there are a number that would be described by some as unique and others as hideous. A few examples include the mottled sculpin, brook stickleback, and longnose gar.

Who should consider trying native species in the home tank? Actually anyone with the basic equipment can keep them. Besides the aquarium, essentials are the filter, air pump, hood and gravel.

Orangespotted sunfish.

Heaters are not necessary, which saves a little on the electric bill. Any size aquarium will do, even one as small as five gallons. The hood should fully cover the tank to prevent fish from jumping. Although a light is not required, it's convenient and makes viewing more enjoyable. Current or former tropical fish enthusiasts may already have everything needed in extra or idle parts. Others starting from scratch can buy their equipment from any reputable pet store that sells tropical fish. Some retailers provide information or "how to" books on maintaining aquariums for natives. Teachers and naturalists should be able to use natives in classroom science projects or exhibits for interpretive centers.

The kind of fish selected for the aquarium really depends on each individual's tastes and objectives. For those with larger aquariums and inclined toward the unique, predatory species like longnose or shortnose gar would be a good choice and also provide action and drama when minnows are dropped into the tank at feeding time. Others who prefer variety can keep several smaller species in a community aquarium. Good choices for them might be spotfin shiners, longnose dace, banded killifish and Iowa darters. Teachers and naturalists could consider using the brook stickleback's elaborate courtship displays to complement studies on animal behavior. Before making final decisions, aquarium owners should try to become generally familiar with some of the more common fishes. They should learn a little about the species' physical appearance, behavioral characteristics, range, habitat and abundance. This information can be found in *Fishes of Wisconsin* by George C. Becker, published by the University of Wisconsin Press. The book is expensive, but most libraries keep a copy on their reference shelves.

Once the aquarium has been set up, start to plan your first collecting trip. For starters, try lakes and streams near home where there should be ample variety, enough to satisfy almost anyone's initial interests. Probably the most convenient and often most productive spots are the public accesses for boating and fishing located on numerous lakes and streams throughout Wisconsin.

Seines and minnow traps are the two most common types of collecting equip-

Konrad Schmidt is a director for the North American Native Fishes Association. Mary Schmidt is an elementary teacher for Horace Mann School in St. Paul, Minn.

ment and available from many bait and sporting goods stores. Seines are the more popular of the two because they produce immediate results while minnow traps have to be set anywhere from a few hours to overnight. Seines come in several lengths, but anything longer than 15 feet can be difficult to pull and maneuver especially in dense aquatic vegetation or narrow streams and side channels. The inside foot of both people pulling the seine should always be kept on the lead line to prevent the lower edge of the net from riding too high above the bottom. In streams with riffles where darters and sculpins are often found, seines work best when held stationary and flush to the bottom while a third person walks a zigzag through the rocks just above the net. Minnow traps, on the other hand, require patience but some find them easier to use than seines. Minnow traps need to be baited with bread crumbs or canned cat food and are best placed in shallow, weedy areas of lakes or eddys and backwaters of streams and rivers. As the name implies, minnow traps are more selective for chubs, dace and shiners, but will also work for brook stickleback's, Iowa darters and stonecats.

There are a couple of helpful hints that should be kept in mind while collecting and keeping native fishes. Both seines and minnow traps will frequently catch far more fish than can be safely transported or kept in the aquarium. It often becomes very difficult to set self-imposed limits on fish brought home, but overcrowding must be avoided. One easy formula to remember is that an aquarium can comfortably support a fish about one inch long for each gallon of water. When removing fish from seines and traps, handling should be kept to a minimum and on very warm days, fish should be sorted from minnow buckets or left "corralled" in the seine near shore. Fish arrive home in the best condition when transported in some type of insulated minnow bucket such as one made of styrofoam. Natives vary greatly in the kinds of foods they will accept. Live foods including insect larvae and small crustaceans are eagerly devoured by even the most finicky fish, but a steady supply can be difficult to store and maintain without frequent trips to local ponds and marshes. Most aquarium owners like the ease and convenience of the dry, frozen and live foods sold by pet stores for feeding tropical fish. Minnows generally adapt very nicely to dry-flake foods, while darters like to dine on a slightly richer diet of frozen brine shrimp.

As with most hobbies and interests, involvement steadily grows with time and

Author Mary Schmidt, an elementary teacher for Horace Mann School in St. Paul, enjoys keeping fish. Photo by Konrad Schmidt

Wisconsin Minnow Collecting Regulations

It is illegal for anyone except licensed bait dealers to possess more than 600 minnows. It is also illegal for nonresidents to sell minnows.

Bait minnows may be taken by the following methods only:

✓ Hook and line.

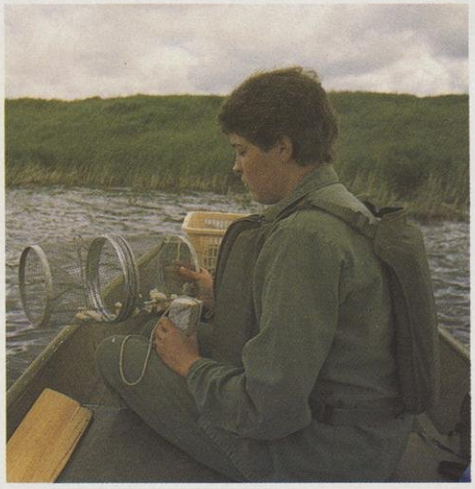
✓ With seines no more than 15 feet long with a mesh no more than one-half inch stretch measure in inland waters. Fifty-foot lengths of seine may be used in Minnesota and Iowa boundary waters and 75-foot lengths in outlying waters.

No seines or dip nets can be used in trout streams. Minnow traps are allowed, but only during the open trout season. Only three are permitted.

✓ With dip nets no more than eight feet in diameter or square.

✓ With traps no more than 14 inches long and 16 inches in diameter or square with a throat measuring one-and-a-half inches or less. All traps must bear their owner's name and address and be emptied at least once every 24 hours when set in trout waters (allowed only during open season on trout) and at least once every 48 hours when set in all other waters. On Minnesota and Iowa boundary waters, minnows must be removed from traps at least once a day from one hour before sunrise to one hour after sunset.

Two people study the intriguing contents of their red collecting bucket. Photo by Konrad Schmidt



The minnow trap is common collecting equipment. Photo by Konrad Schmidt

Permit needed for some fish species

Endangered

1. **Goldeye** ***(Hiodon alosoides)***
2. **Crystal Darter** ***(Ammocrypta asprella)***
3. **Starhead Topminnow** ***(Fundulus notti)***
4. **Gravel Chub** ***(Hybopsis x-puntata)***
5. **Pallid Shiner** ***(Notropis amnis)***
6. **Striped Shiner** ***(Notropis chrysocephalus)***
7. **Slender Madtom** ***(Norurus exilis)***
8. **Bluntnose Darter** ***(Etheostoma chlorosomum)***

Threatened

1. **Blue Sucker** ***(Cycleptus elongatus)***
2. **Goldeye** ***(Hiodon alosoides)***
3. **Speckled Chub** ***(Hybopsis aestivalis)***
4. **Black Buffalo** ***(Ictiobus niger)***
5. **Longear Sunfish** ***(Lepomis megalotis)***
6. **Ozark Minnow** ***(Dionda nubila)***

These species are protected by laws which prohibit collecting without a permit issued by DNR. Because of their extremely limited distribution in Wisconsin, "recreational collectors" need not be too concerned about unknowingly taking a listed species. Nevertheless, everyone will get a great deal more out of keeping natives when all the fish collected can be identified. This is sometimes difficult, especially when dealing with some members of the minnow family, but it can be done with the aid of a good identification key like the ones provided in *Fishes of Wisconsin* by George C. Becker or *How to Know the Fishes* by Samuel Eddy and James Underhill.

The information in this article barely scratches the surface, but it is a beginning that will hopefully help anyone interested in natives better understand and appreciate one of Wisconsin's overlooked but fascinating natural resources.

several opportunities can be pursued while keeping natives. One organization to check for ideas is the North American Native Fishes Association (NANFA). It's also a place where you can meet others who share the same interests. NANFA can provide information on aquarium care and maintenance, collecting methods, trip planning, breeding natives in aquariums, general life histories, photographic techniques and conservation issues. For more information about NANFA, contact Bruce Gebhardt, President, 123 W. Mt. Airy Ave., Philadelphia, PA 19119.

Teachers and naturalists have a considerably wider range of options and need not be restricted solely to native fishes. A classroom or nature center aquarium can provide an ongoing learning experience for many other aquatic species such as plankton, crustaceans, insects, amphibians and plants. Possible introductory studies could include a class field trip to a local state or county park. Many naturalists and teachers incorporate aquatic exercises in the course curriculum. If possible, several specimens and water samples should be collected for more in-depth study back at the classroom or nature center. Plankton nets will be needed for taking microscopic organisms, but minnow seines also work well for collecting tadpoles, salamanders, crayfish and plants. Many are compatible with native fishes and often make interesting additions to a community aquarium. Follow-up exercises could include identifying species of fish, insects and plants by keying them out in guide books; using microscopes or microprojectors to view protozoa, hydras, daphnia and phantom midge larvae; pressing aquatic plants for a class collection; and testing water samples for pH and total alkalinity and relating this information to the effects of acid rain.

Even though a fishing license is not required to collect non-game fishes, everyone should be aware that there are regulations that govern collecting equipment, methods and locations. Most of this information is provided in the fishing regulations pamphlet which is available from any DNR office or sporting goods store which sells fishing licenses. This information should be reviewed each year for any changes or additions related to the use of seines and minnow traps.

Last, but not least, something must also be said for Wisconsin's rarer fishes. The Bureau of Endangered Resources currently lists 14 fishes as endangered or threatened which are listed here.

FISHERIES

Together we can work wonders

Wisconsin's fishing scene is changing. Fast! And its shape in the future depends on many factors. Some we can control, some we can't. How we deal with the ones we can handle and the ones we can't will determine what kind of sport fishing we'll enjoy when the 21st century dawns.

Many of the stories in this special issue of the magazine provide some guidance.

"Fish Wisconsin 2000," as outlined in the centerfold pullout poster, is a tool DNR has developed to help prepare for society's changes over the next 13 years. With this kind of preparation, we can assure all of you who like to fish — they'll still be biting at the end of the millenium. In a sense, "Fish Wisconsin 2000" represents a vision. In part, it's what we managers believe is going to happen to fisheries, and in part it tells what we must do to maintain your support, the essential ingredient for good fishing in the future.

Over the past several years, I've said in these pages that our managers have to make better use of volunteers to help protect the fishery resource. DNR simply does not have the manpower or money to do the job without your help, a situation which I don't expect to see change a great deal over the next 13 years.

A good example of the kind of citizen-professional interplay I'm talking about is described in the article on the musky club at Portage. Almost on its own, the club — like several others in the state — has produced a highly valuable product that benefits all Wisconsin.

A different tool that brings state of the art thinking and equipment to bear on fish management problems is described in the article on scientific techniques. Computer and sonar have helped us resolve a range of problems — from pretesting regulations by creating models of fish populations to examining the effects of predator stocking on population structure.

Now, let's home in on some of the major problems fish managers have on their minds today.

In rural Wisconsin, the way farmers choose to manage their land will largely determine the future of recreational fishing. The practices they choose will make or break stream quality in every watershed. The kind of cultivation and drainage, the kind and amount of fertilizer used, the priority given to maintaining a scenic landscape, and how they choose to control access through their land all impact fishing. And tourism too!

"I enjoy finding out (perhaps more than I should) that, over time, much of our so-called conventional wisdom falls by the wayside as fresh knowledge comes to light."

Jim Addis, Director of DNR's Bureau of Fish Management.

Another matter is the practice of stocking. If DNR could somehow expand capacity and produce seven- or eight-inch walleye fingerlings instead of two- to three-inch ones, effectiveness of the whole program would soar. Now, staffing and funding limitations prevent it. Our dream is to use volunteers, private contractors and other means to grow larger walleye fingerlings as well as other warmwater species to stock in suitable habitat.

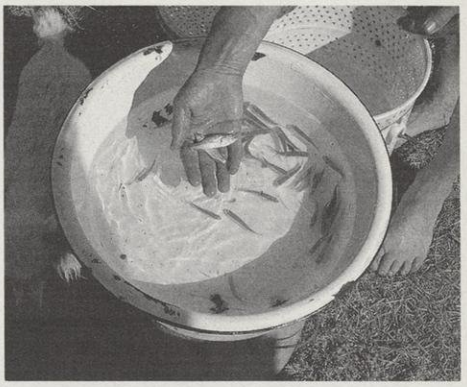
To take this line of thought a little further: we know we can improve the results of stocking by using strains better adapted genetically to the habitat in which they're planted. To do this, we'd have to operate our hatcheries differently — raise and stock wild fish instead of traditional domestic strains.

We'd like, by the turn of the century, to have most of our rearing and planting program geared to ecologically sound policy that directs fish stocking to waters that have specific potential for increased populations. We also hope the fish we stock will consist of those special strains that are ideally suited to receiving waters.

Meanwhile, we're aware of many areas where fishing piers and stream bank access are needed to increase the miles of stream and lake shore available to anglers without boats. The same is true of lake access for anglers with boats. We've identified numerous launching sites local people support and are proceeding to build them as funds become available.

Piers and bank access present intriguing possibilities for attracting fish to these sites for anglers to catch. We could use present techniques like fish cribs. Other techniques may be available that we're not exactly sure about yet, but we're thinking!

Returning to "Fish Wisconsin 2000," the plan is not only a blueprint for the future, it's also designed to spark a coalition that can give the fishery program many new sources of support. It's an idea that can help others define a role for themselves in the fishing program. All of us in the bureau envision that fish managers, environmental specialists and anglers will soon get help from small business, the tourist industry, farmers, local government and many others. Good fishing helps everybody. Together we'd shape a long-term vision of the role fishing can play in the lives of Wisconsinites and visitors.



More volunteers are getting involved in fish management practices. Here's the beginning of some private bass-stocking. Photo by L. Kalepp

From a personal point of view, one of the reasons I enjoy working in fisheries management is the variety of problems I can help solve. I enjoy finding out (perhaps more than I should) that, over time, much of our so-called conventional wisdom falls by the wayside as fresh knowledge comes to light. I well remember times as a young manager, when a good idea or action plan was turned back by all knowing old-timers. "We've tried it all before," they'd tell me, "and what you're considering just can't work."

That attitude, which rubbed me the wrong way, is something I've made a commitment to avoid. The hazards of conventional wisdom keep surfacing.

Here's an example: for years, most managers at DNR thought mechanical removal of slow-growing or stunted panfish with nets was not feasible. It would take a tremendous effort to remove enough so that the remaining fish could grow to desirable size. We just didn't think we could pull it off, based on a few early starts with carp.

But DNR's Brian Belonger was stubborn — and insightful. As fish manager in Manitowoc County, Brian decided to try mechanical removal on English Lake. He felt the biology of the lake system simply cried out for such an experiment. He did it, and he succeeded. Panfish angling improved, and the cost was in bounds.

Predictably, Brian's success at rethinking conventional wisdom spurred other managers to try the same.

At Barron, Manager Rick Cornelius thinned a stunted panfish population and resolved a winterkill problem with help from local clubs and government officials. To do it required DNR's nets manned by local volunteers and a joint project to install aerators. This work created a group of strong supporters, better understanding of our programs and some gratifying respect.

I'll admit that once I nearly let the thorn of conventional wisdom scratch a project. Thank goodness, I kept my initial feelings to myself. When I arrived on the scene at Friendship Lake in Adams County, Fish Manager Scot Ironside had assembled hordes of people on the landing. There were pickup trucks carrying horse troughs, a DNR stocking truck from Woodruff and eight or 10 fyke nets set to harvest fish. Scot and the local people were loading netfuls of stunted panfish onto the trucks for transport to Castle Rock Flowage.

One goal was to save the game fish in the lake, keeping them for restocking. A second goal was to thin the lake's panfish and reduce some of the competition for available food. Another goal was to give the relocated panfish room to grow to trophy size and provide fishing at Castle Rock. Scot would follow up by restocking predator fish in the lake to help keep panfish in check and provide some good predator fishing.

Local central Wisconsin groups help with fyke netting. Photo by Scot Ironside

Confounding the conventional wisdom by removal of stunted panfish from a small lake and stocking them in a bigger one.

At first, I was taken aback by all the activity. My conventional wisdom told me this young fish manager's plan could never succeed. I thought the project wouldn't work, but that we'd see a big demand for more like it because the public liked it — that it was good public relations but no substance. I feared that Scot may have gotten himself into a corner.

But, lo and behold, the project worked! The stunted panfish moved to fertile Castle Rock Flowage are growing and provide a diversified fishery; ice fishing for panfish on Friendship Lake has improved dramatically; and by working closely with local officials, private owners were able to make changes that might help improve panfish habitat.

The lesson comes home again. Volunteers and Scot's vision confounded conventional wisdom. They made the project happen and made it cost effective.

Which brings us to you.

How about it? You too can play an active role. Help us keep your fishin' hole healthy and a source of enjoyment going into the next century.

Let us hear from you. Together we can work wonders.

BADGER LORE

Charles A. Long, biology professor,
UW-Stevens Point

An international underground machine even more formidable than UW's Bucky or the state historic symbol.

Charles A. Long is Professor of Biology and Curator of Mammals at the University of Wisconsin—Stevens Point. Former longtime director of the museum there, Long is co-author with Carl Killingley of *The Badgers of the World,* published by Charles C. Thomas of Springfield, Illinois. The book is a comprehensive treatment of both the recorded and natural history of all the world's badgers, including Wisconsin's.

Wisconsin, our home, is often called the "Badger State." What do we Wisconsinites know about our animal? Actually, most of us know quite a lot. After all, the badger is not only our state animal; it is our state symbol. Known on three continents, badgers are not so well thought of in some quarters as in Wisconsin, where our species is protected year round.

We all know about Bucky Badger, a caricature for the athletic strength of the university in Madison. Pictured on countless sweatshirts, beer mugs, and on many logograms of businesses, this confident badger is "right at home" in Wisconsin. However, the nickname "Wisconsin badger" referred long ago to pioneers, to miners working in southwest Wisconsin. Some of them even lived in dugout habitations.

Because of Bucky's popularity, a lot of attention has been paid to the real badger *(Taxidea taxus)* who lives a lonely, independent life as far away from people as possible. Occupying some remote pasture, drained marshland, or grassy hillside, *Taxidea* prowls about making its excavations, searching for the rodent pests that are its prey. The North American badger is beneficial to man, something every state resident should know.

A hunter and a fantastic digger with huge clawed forefeet, A Wisconsin badger can dig through the asphalt blacktop of a highway. Once, when one was brought out to a football game it provided more of a show than expected. It promptly submerged beneath the sod to meander around under the grass, delaying the game and causing damage to the field that ultimately cost plenty to fix. In nature, *Taxidea* digs into the burrows of rodents and eats them. Badgers are so beneficial that the holes they dig are more than compensated for by the huge numbers of rats, mice and other pests destroyed. Rodents destroy crops and spread disease. Badgers eat a remarkable variety of other animals too, ranging from worms to snakes, but rarely consume vegetal material. Their dens are not as dangerous to livestock as many people believe and the unused burrows often become homes for other fur-bearers.

The Wisconsin badger is usually born in a natal den with one or two, occasionally three brothers and sisters. By summer the youngsters emerge in the evenings to play outside the den. The mother brings dead rodents for the young to eat. She protects her babies, but the father goes his own way. Weaning occurs in late summer and the young badger eventually must make itself a winter den where it sleeps until spring. Sometimes the badger awakens from its winter torpor and stirs around. If lucky, it will live through 14 winters. In the second summer, badgers seek mates, although occasionally some females breed before that.

A snarling, growling badger is sometimes mostly bluff, but in defense it is a savage fighter with mighty jaws and great courage. Photo by Stephen J. Lang

Embryos do not implant in badgers until the winter is past. About five weeks after delayed implantation, usually in March, a litter is born blind and helpless. The eyes open in four to six weeks.

Males are noticeably larger than the females, occasionally weighing 25 pounds. In the southwestern United States the whitish head stripe usually extends dorsally even to the base of the tail. All the southern badgers are small.

Badger fur, in fashion, has been in great demand. Not long ago, in other states, a pelt sold for more than $100. But in Wisconsin we value more than fur the thrill of seeing a wild, living badger. It always is a memorable experience. Badgers are not seen by just everyone. They are

not that common. To surprise one outdoors with its boldly striped head, conspicuous "badges" set off by white cheeks, huge claws, black intense stare and awesome fluffed out body crouching low to the earth is a fearsome, menacing sight not quickly forgotten. The ferociously snarling and growling badger is mostly bluff. But in defense the badger is a savage fighter, with mighty jaws and great courage.

Because of this courageous behavior and incredible ferocity in fighting to save its own life, the badger has earned itself a place in our dictionary. To "badger" somebody means to persecute the way shameful people in centuries past persecuted badgers.

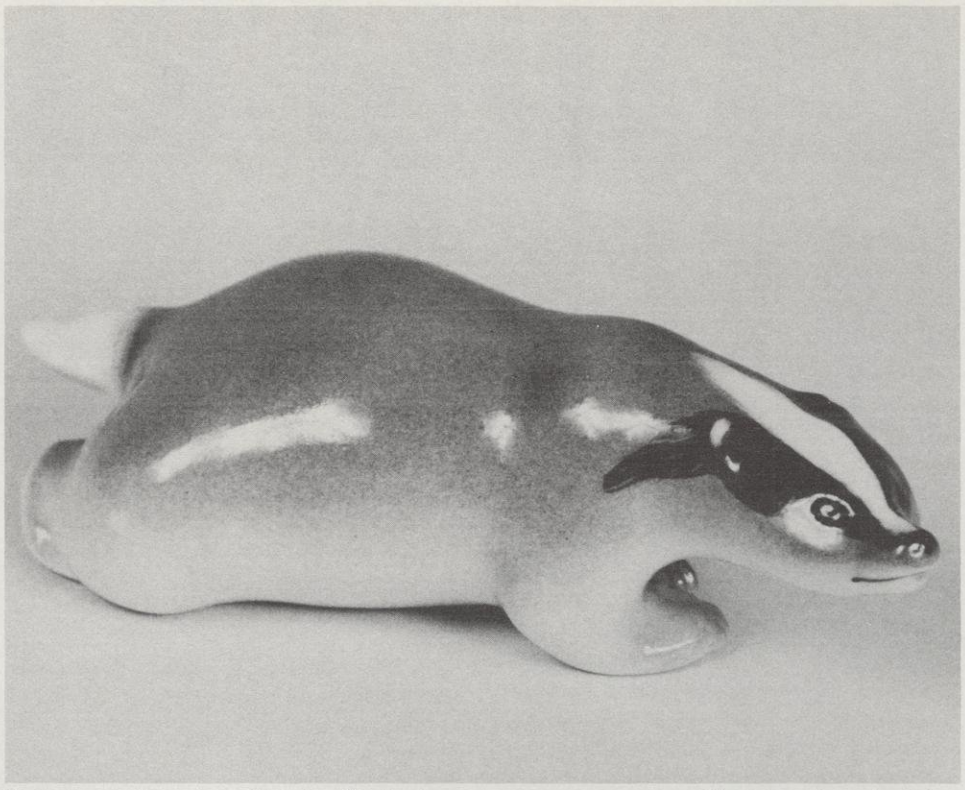
Often cornered in a barrel, or chained out in the open and surrounded by screaming crowds, a badger was pitted against fierce and powerful dogs, one after another, and sometimes all at once. The badger maimed plenty of the dogs before valiantly dying in the frenzy. Usually this disgusting "sport" was enjoyed in England, where (over the centuries) special practices evolved. Pits were built of brick for people to stand around to watch; and to save dogs the badger's jaw was broken or even sawed off.

Other cruelties in England included the "sport" of "badger digging." A mob of men dug up a burrow or "sett" and beat the poor animal to death with shovels. Chained badgers occasionally were burned alive or drowned by high tides, at Easter time. These cruelties, started in Medieval times in England, continued until only a short time ago.

But it is darkest before the dawn. Today England is rightfully proud of its sophisticated and humane treatment toward animals. On such a small, crowded island it is very necessary that sound game management practices be carefully followed.

Special culverts are constructed to allow badgers to pass beneath the highways. Some people go out in darkness to quietly observe while the boldly marked badgers emerge from their setts to forage for worms. Carl Killingley took my wife out to see a badger and they saw eight in one evening. In England badgers are now protected by law.

The European badger is sociable; badgers there live in family clans and seldom fight among themselves. There is a great deal of family play, and bachelor males amiably join in with fathers and mothers frolicking in the moonlight with the fat little "cubs." But all the adults defend the clan territory against strange badgers from other clans.



Known on three continents, the badger comes across as a likable critter in this Russian ceramic figurine. Illustration from The Badgers of the World, Long and Killingley.

In Asia there are several kinds of badgers: small ferret badgers that may climb a tree to catch birds; the hog badger which is a white-tailed, long-snouted counterpart of the European kind; and the stink badgers of Borneo, Java and the Philippines. These are skunk-like, and the black-and-white Java species has a powerful scent that rivals the awful smell of skunks.

The Honey Badger of Africa and Asia, also called the Ratel, is so fierce dogs cannot subdue them. Occasionally they kill huge beasts such as the African buffalo or the gnu. Lions kill honey badgers, but these same animals have been observed driving lions off a kill. A small bird called the honey guide leads this powerful black and white badger, no larger than a medium-sized dog, to a honey tree. After the badger rips open the tree, the two share the spoils.

All of these badgers are fierce and fascinating creatures. The more we learn about them, the more we are proud to call ourselves badgers.

Badgers never go out of their way to cause trouble. But they are capable and awesome defending themselves against any kind of odds. Their conspicuous markings provide advance warning of swift retribution.

The badger is revered in Japan, where the word badger means wise and shrewd. Several legends feature talking badgers that turn themselves into kettles and other things. The talking badger is a god of merriment and drinking. Some Saki bottles are made in the form of a jovial badger.

God of the Hebrews accorded to the badgers of Israel the highest honor of all. The Holy Word commanded that the Holy Tabernacle be tented over with badger skins, forming a luxurious canopy made to enshrine a holy place for the spirit of Jehovah in his temple amid his people. Perhaps Wisconsin likewise is a temple, where the badger is our symbol and dwells in peace today among a blessed people.

Jim Falls Hydro

POWER WITH A PLUS

Tom Lovejoy, DNR Environmental Impact Coordinator, Eau Claire

Progress and the environment often clash. This time, each side wins.

Northern States Power Company's diligence in protecting natural resources was recognized in 1984 when the company received DNR's John C. Brogan Award for environmental leadership.

The environment is winning at Jim Falls.

It's happening because stubborn people wanted it to win.

Some of the people work for Northern States Power Company, which is spending $91-million to expand its Chippewa River power plant at Jim Falls. Others work for the Department of Natural Resources.

Together, they're both protecting the environment and helping meet Wisconsin's future energy needs.

But today's cooperation didn't come easy. It took time to develop trust in one another. It took people willing to look at the river from each other's viewpoints.

Here's what happened:

"You want to what?" the DNR official asked.

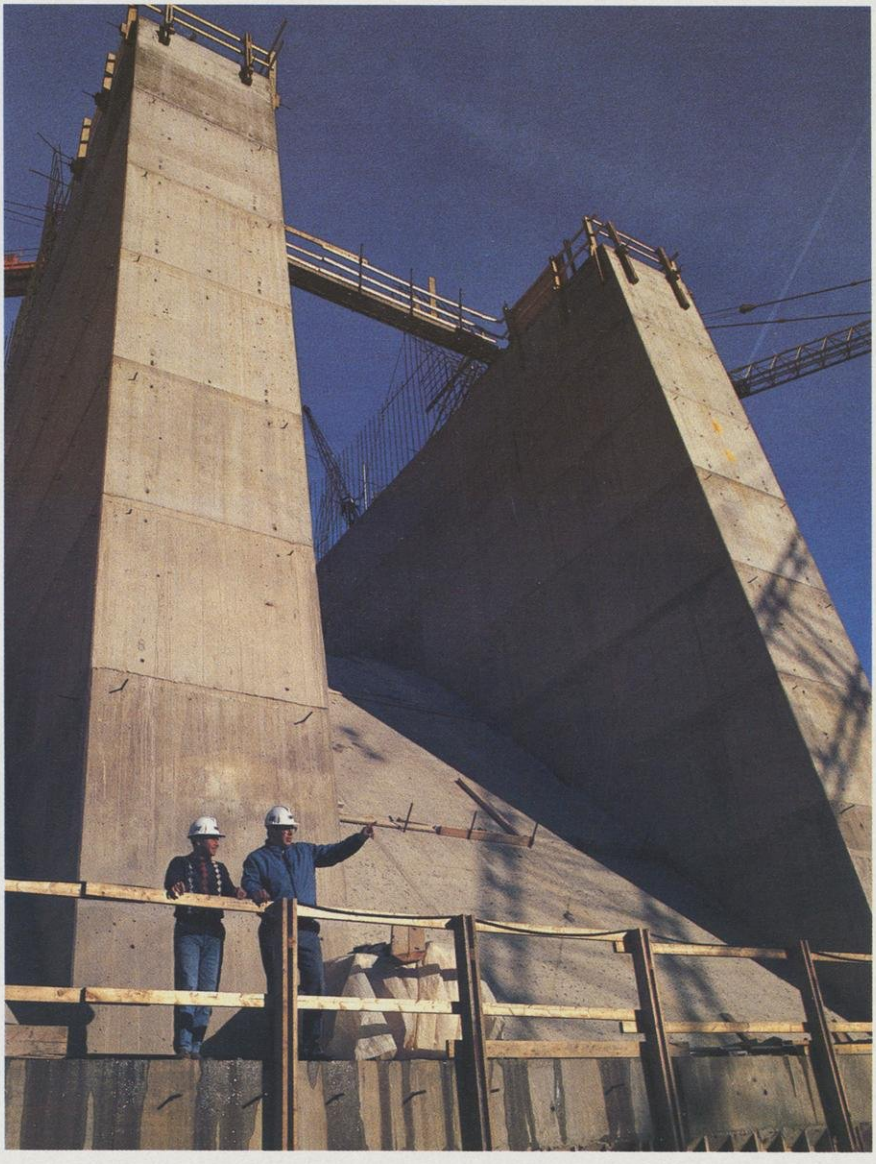
Quietly, the NSP representative repeated himself. NSP wanted to rebuild its Jim Falls hydropower plant on the Chippewa River, upgrading plant size massively. "And," he said, "we want to design, construct and operate the project to be unequivocally acceptable by government agencies and the public."

An admirable approach, thought the DNR officer. Years of experience sadly showed things rarely happen that way. Instead, the scenario is like a tug of war pitting development against the environment and private interest against public interest. Frustrating confrontation was the all too familiar standard. It was a history of skirmishes, but no clear cut victories.

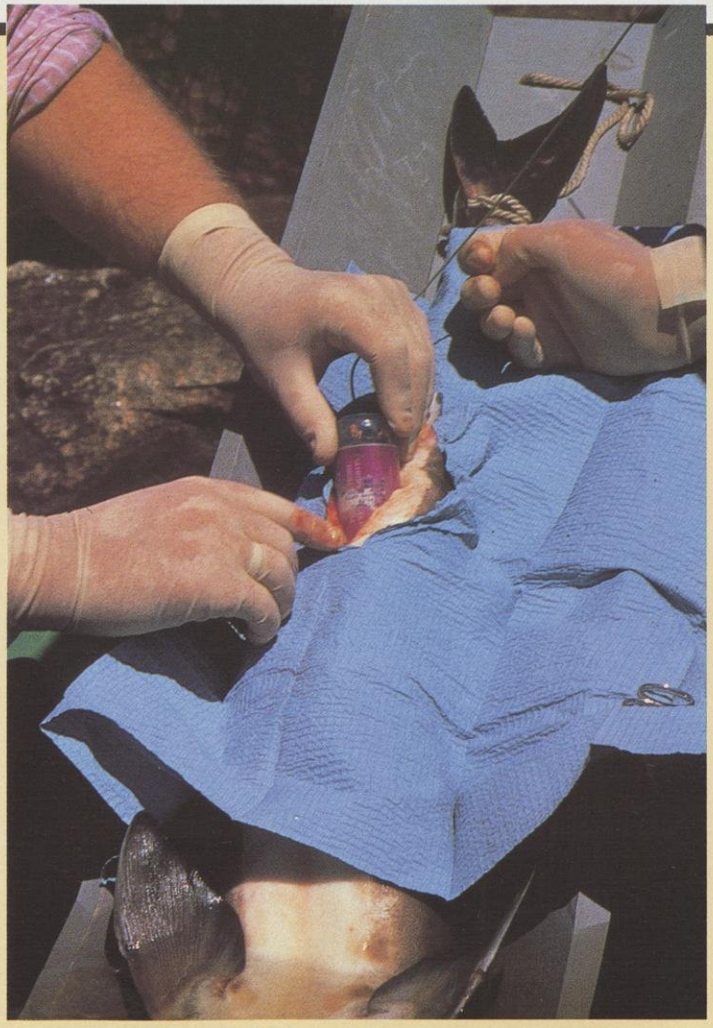
"What you're asking is going to be difficult," the DNR official said, "perhaps impossible."

The power company executive didn't hesitate. "I know, but let's give it a try."

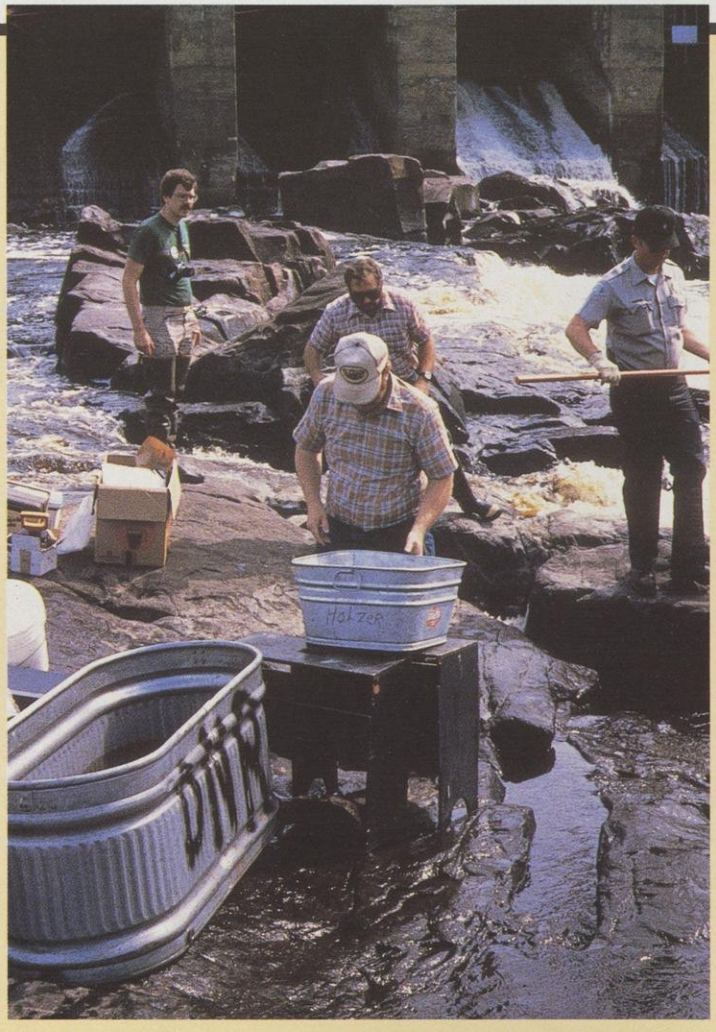
That's how NSP proposed its Jim Falls hydropower redevelopment to my predecessor, Gordon Slifer. Now, nearly seven years later, and two years into a four-year construction schedule, the "impossible" is becoming reality.



Surveying the downstream side of the new auxiliary spillway, are Lynn Winter, left, Northern States Power Company project superintendent, and Tom Lovejoy, DNR environmental impact coordinator, Eau Claire. Photo by Dave Weitz



A radio tracking study of sturgeon, which commonly reach 40 to 50 pounds, has been ongoing since 1985 and will continue through 1990. Photo by Doug Erickson



At the base of the existing spillway, NSP and DNR personnel collect sturgeon for radio transplants. Photo by Joe Kurz

Keeping Track of Fish

Joe Kurz, Assistant Area Fish Manager, Chippewa County

Northern States Power Company (NSP) and the Department of Natural Resources (DNR) will cooperate in surveying fishery impacts caused by the construction and operation of the new Jim Falls power plant. The focus is on Old Abe Lake and the Chippewa River immediately downstream from the spillway and new powerhouse. NSP will donate funds for several aspects of the study which has been cooperatively developed by DNR, NSP and the US Fish & Wildlife Service.

The objective for Old Abe Lake is to define the aquatic biological communities and available fishery habitat. Population estimates will be made for both rough and game fish, abundance of forage fish and aquatic invertebrates will be measured, food types used by prevalent game fish species will be determined and aquatic habitat characteristics will be mapped. In addition to the survey, a year-long creel census will reveal angler use and fishing success.

Downstream, survey efforts will focus on lake sturgeon and use of the river by other game fish. A radio-tracking study of sturgeon, which commonly reach 40 to 50 pounds, has been ongoing since 1985 and will continue through 1990. The study will follow any changes in seasonal movements of the big fish in response to construction and operation of the new plant. Spawning use and success by sturgeon and other game fish species will also be examined. Removal of rock constrictions in the river channel has already been done by NSP to aid upstream movement of fish to historic spawning areas. A constant minimum water flow into the channel during critical periods is expected to increase spawning success.

NSP will also finance improvements to fish habitat in Old Abe Lake. Prior to flooding, rock and tire reefs will be placed in the new lake portion in the pilot channel. Other wood and tire fish cribs will be placed at various locations throughout the lake with assistance from the Chippewa Rod and Gun Club. The standing stump field in the new section of the lake will improve habitat diversity. Existing dikes and islands will be riprapped to enhance productivity of fish and other aquatic life which, in turn, should improve angling conditions and success. Future studies will evaluate the success of all habitat improvements.

Improvements at the Jim Falls project fall in line with DNR's present emphasis in fish management which features aggressive management of warm water systems. NSP's enthusiasm in protecting and improving the Chippewa River is a significant contribution. It will help DNR meet its fish management objectives.

The $91-million hydropower reconstruction now underway will make the new plant the largest hydroelectric generating facility in the Midwest. Environmentally, it's one of the best.

The facility is one of a chain of NSP hydros on the hard working Chippewa River. About 20 miles north of Eau Claire, the Jim Falls dam and powerhouse stretch across the Chippewa, creating 1,000-acre Old Abe Lake. The new plant will increase electrical generating capacity from 11.4 to 48 megawatts, enough power to supply 35,000 homes in western Wisconsin.

The existing plant can utilize a water flow of only 3,500 cubic feet per second (cfs) to make power, while hydros upstream and down are able to use up to 12,000 cfs. Until now, excess water at Jim Falls has been "wasted" over the spillway. The new facility, with capacity similar to the other hydros, will capture more of the river's available energy.

As DNR's current project coordinator, I work with NSP to resolve environmental concerns on the project. On my first visit to the construction site in August 1985, I could see this was no small assignment. Spread out over nearly 100 acres was a battalion of construction workers operating a fleet of oversized cranes, bulldozers and other heavy equipment. They were systematically clearing, gouging and blasting their way into the earth and underlying granite bedrock. Roughly 400,000 cubic yards of soil and rock, more than 4.6-million wheelbarrow loads, was being excavated, and all within a few hundred feet of one of Wisconsin's greatest rivers. At first impression, I had difficulty accepting that DNR, as an environmental watchdog, could have permitted such disturbance.

Over time and several return visits, I could more comfortably visualize the emergence of a meritorious final product. The cavernous pit being burrowed out was needed to place the footings for the new powerhouse. The giant circular steel cells and sheet pile walls looking over the pit's perimeter would keep the site dry during high floodwaters. A half-mile long, trench-like pilot channel, which would carry flow to the two new turbine generators, was already taking shape. The new dike wall, which would be the new shoreline for the 60-acre addition to Old Abe Lake, was already recognizable.

As complicated as the construction scene was, I knew some of the toughest work took place before any soil was turned. At the conceptual stage, NSP had several preliminary design options, each capable of dramatically increasing energy generation. Through early coordination with DNR, sensitive environmental features at the site were identified. Public meetings were held to solicit ideas and opinions from the Jim Falls community and elsewhere. Most importantly, NSP asked questions and then really listened to what people had to say. Environmental, social and economic issues were compared with design alternatives, producing a final plan that best satisfied everyone's interests.

The new powerhouse under construction. Photo by Lynn Winter

Subsequently, many long hours of meetings, planning, engineering and field work were required to activate the final plan. A major part of this effort included NSP and DNR representatives working together to incorporate acceptable environmental protection and enhancement measures. It was a tough job.

The Chippewa River system today is highly valued for fish, wildlife and recreation, but biologists believe it capable of sustaining even greater levels of biological productivity and more recreational opportunity. Environmentally speaking, the challenge at Jim Falls was not only to protect what was there, but to improve it.

One of the most critical concerns involved lake sturgeon. This ancient species uses tailwater downstream from the Jim Falls spillway as a prime spawning site. But hydropower generation often drastically manipulated water levels which could range from a trickle to raging surges in just minutes. At spawning time, if gates were closed abruptly, flow downstream would be shut off, stranding fish and eggs in rocky deathtraps. Even though NSP and DNR officials would attempt rescue, the impact on spawning success was immense. Rebuilding the Jim Falls dam offered an opportunity to correct this problem.

DNR, with funding support from Northern States Power, initiated an intensive sturgeon behavior-tracking study. The information revealed would be used not only to protect sturgeon at Jim Falls, but also at other locations. Stranded sturgeon were netted and tagged by fishery biologists and radio transmitters surgically implanted in 14 adult fish to monitor movement and habitat requirements. Rocky restrictions, which created access and escape barriers in the tailwater, were removed. To provide a constant flow of water adequate to support fish and aquatic life in the tailwater pool and channel, the power company installed a mini-powerhouse at the spillway. This is designed to pass a constant flow of 240 cubic feet of water per second during critical fish use periods and at the same time generate 500 kilowatts of power for NSP.

Meantime, upstream of the dam and spillway in Old Abe Lake, more fish habitat improvements are planned. The lake bed is typically flat with little structural diversity for bottom-dwelling organism production and fish rearing habitat. Excess rock excavated from the pilot channel will be strategically placed along banks and in the channel to improve habitat. Fish cribs will be installed in the lake to improve fish production. A shallow-water stump field in an area cleared as part of the 60-acre lake expansion will be left intact to increase fish and fish food production. Shallow areas like these with submerged structures are uncommon on the Chippewa.

Gordy Slifer, who is now the DNR fisheries staff specialist in west central Wisconsin, predicts these improvements will result in fishing success "the likes of which the Jim Falls area hasn't seen in years."

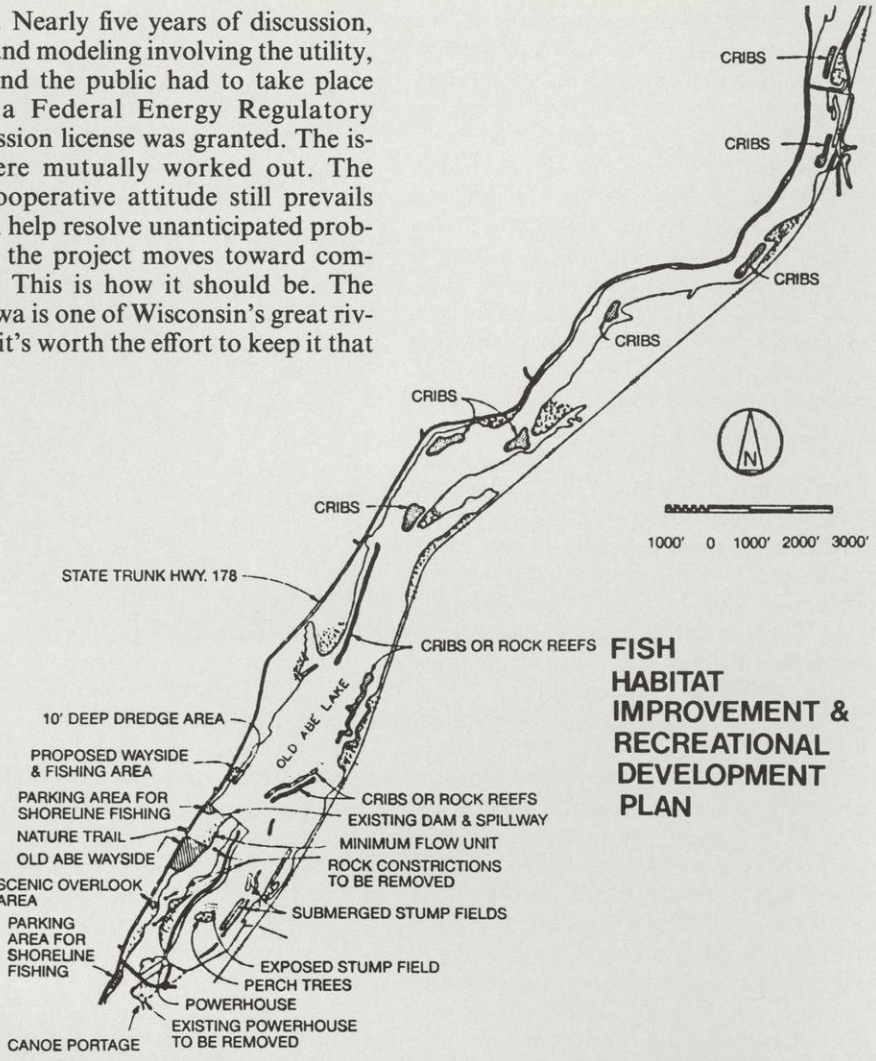
Scenic beauty at the site is also being preserved.

Motorists on State Highway 178 are treated to one of the Chippewa's most scenic views along the river near Jim Falls. The "old" river channel below the spillway is the site's natural "crown jewel." The rock boulder river bed is flanked by high granite ledges capped with mixed hardwood timber stands. Like sentinels, white pines tower over the oak dominated hardwoods.

Special design and construction measures have been incorporated to protect these scenic qualities and help more people to enjoy this special place. The old river channel area will be preserved. A 100-to-300-foot wide strip of woods left on the island between the pilot channel and old river channel will provide a vegetative screen from the construction site. A new scenic overlook and walking trails will be developed off Highway 178 to improve access for hiking, sightseeing and bank fishing. In the pilot channel, the wooded tip of a peninsula will be protected. The "island," with its offshore stump field, will extend into the area being excavated as part of the Old Abe Lake expansion. These preserved wooded areas will also provide nesting and roosting perches for birds, including bald eagles and ospreys.

In addition to the overlook and nature trails, other recreational facilities compatible with the river's unique scenic quality are planned. These improvements will serve anglers, hikers, picnickers, canoeists and sightseers. More intensive recreational activities such as sailing, power boating and water skiing are available at Lake Wissota just downstream on the Chippewa. A wayside park just upstream from the existing spillway along Highway 178 will feature picnicking, bank fishing for the handicapped and a boat ramp and dock. A new canoe portage route with launches and a picnic area will be developed near the powerhouse. All these improvements mean a greater opportunity for everyone to use and enjoy the Chippewa River at Jim Falls.

In the end, the stubborn people succeeded. The final plan made the "impossible" possible, a lesson in cooperation! All these benefits—increased power production from a renewable energy source, environmental enhancement and public recreational opportunity—didn't just happen. Nearly five years of discussion, design and modeling involving the utility, DNR and the public had to take place before a Federal Energy Regulatory Commission license was granted. The issues were mutually worked out. The same cooperative attitude still prevails and will help resolve unanticipated problems as the project moves toward completion. This is how it should be. The Chippewa is one of Wisconsin's great rivers and it's worth the effort to keep it that way.



A wayside park just upstream from the existing spillway along Highway 178 will feature picnicking, bank fishing for the disabled and a boat ramp and dock. Photo by Dave Weitz

The sky is falling

Julian Chazin, Chief, DNR Air Monitoring Section*
Rick Mulhern, DNR Public Information

Cancer causing ultraviolet rays have pierced the earth's thinning stratospheric ozone barrier. A hole in it the size of North America threatens all of us.

The "hole in the sky."

In 1986 scientists reported finding a "hole"—a 40% thinning of the ozone layer—in the skies over Antarctica.

The report refocused attention on chlorofluorocarbons, or CFCs. Not found in nature, these manufactured gases are widely used in refrigerators, air conditioners and for making plastic foam. By chemical reaction, they destroy the Earth's ozone layer and leave people exposed to dangerous levels of the sun's cancer-causing ultra violet rays. Nine years ago, alarmed over gradual decline of the protective ozone shield, the government banned use of freon in aerosol cans. Apparently this was not enough. Stratospheric ozone loss continues. Scientists say this will not only cause epidemic skin cancer, but may also contribute to the global temperature rise known as the "greenhouse effect."

Scientists aren't yet sure whether the big hole over Antarctica was caused entirely by human activity. But they know the general world-wide thinning of stratospheric ozone is caused by our release of CFCs here on earth.

Donald F. Heath, a physicist at NASA/Goddard Space Flight Center, has reported a 3% loss in global ozone since 1981. This loss is concentrated in the upper stratosphere and at high northern and southern latitudes in spring and fall.

Specifically, Heath finds that, averaged over the entire globe, about 12% of the ozone at an altitude of 40 kilometers—the upper, thinnest end of the ozone layer—disappeared between 1978 and 1984. Like Heath, other researchers have reported annual global ozone losses of two to 5% over recent years.

The health effects of these numbers are a frightening cause for concern in Wisconsin and throughout the world. A new Environmental Protection Agency report adds to the worry. It suggests that at current CFC emission rates, ozone depletion could contribute to 40 million cases of skin cancer and 800,000 cancer deaths in the US in the next 88 years. To make matters worse, EPA estimates that without international regulation, CFC emissions will increase 5% per year.

Stratospheric ozone depletion will affect not only human health, but also natural resources. More ultraviolet light will increase the level of smog and other oxidants in the atmosphere, and in turn quicken acid rain formation. EPA also cautions that higher ultraviolet radiation could adversely affect aquatic organisms.

A distinction needs to be made between the bad kind of ozone formed at ground level and the good kind formed in the upper atmosphere.

Ground level ozone is a pollutant. It is formed in a series of chemical reactions, when the mix of air pollutants in the urban "soup" (volatile organic compounds from engine exhaust and nitrogen oxides) react in the presence of sunlight and oxygen. The resulting pollutant—ozone or smog—is a dangerous respiratory irritant.

But ozone that forms in the stratosphere is beneficial, serving as a shield that filters out harmful forms of ultraviolet and X-radiation. This ozone forms between about seven and 22 miles up, when high-energy ultraviolet light in sunlight strikes oxygen molecules, splitting them into oxygen atoms. When these free oxygen atoms attach to other oxygen molecules, they form ozone.

Unfortunately, there's no way to get ground level ozone up to the stratosphere or vice versa. The two do not interact or otherwise affect one another.

Scientists first began to question the stability of the ozone layer above the earth about 20 years ago when supersonic aircraft were introduced. They questioned whether nitrogen oxide emissions from the SST would change chemical makeup of the stratosphere. Research in 1973 showed that CFCs and a subgroup (CFMs or chlorofluoromethanes) gather in the stratosphere and react readily with oxygen to destroy ozone. In 1975, a special federal task force on inadvertent modification of the stratosphere recommended restrictions on fluorocarbon use. In 1978, the US followed through by prohibiting freon as a propellant in aerosol cans. But except for Canada and Scandinavia, few followed suit. Meanwhile, industrial consumption for purposes other than propellants increased.

Currently, CFCs are widely used in industry to make refrigerants, insulation and solvents. Injected into molten plastic, CFCs bubble up a foam, then are released into the astmosphere as waste. The foam is formed into fast food containers, cups, insulation, packing material and other products. In some countries, aerosol cans are still activated by freon. One group of CFCs, known as halons, is used in certain fire extinguishers. Nationwide, CFC emissions are up 5% per year and the US now emits as much CFC as we did before the propellant ban.

* In February, Julian Chazin, chief of the Air Monitoring Section of the Bureau of Air Management, presented a report on the depletion of the atmospheric ozone layer to the Natural Resources Board. This article is based on his presentation.

Residents here in Wisconsin are likely to feel the sting of atmospheric ozone depletion. So are our natural resources.

By the year 2020, more people will have cataracts, there will be a 5% increase in skin cancer, and our immune systems won't work as well.

At a hearing in March before the House Energy and Commerce Committee, Dr. Darrell S. Rigel, a dermatologist and cancer researcher at New York University, testified that the thinning of the ozone layer is causing an alarming rise in malignant melanoma—the type of skin cancer that often kills. Rigel estimates that the lifetime risk of getting this deadly disease already exceeds a projection made in 1982. At that time, it was estimated at one in 250 for Americans, with a projected increase to one in 150 by the year 2000. Today, he believes it will be one in 135 by the year 2000. If the danger continues to rise, the risk will be one in 90 by the year 2000—that is, 10% of the population would be expected to develop melanoma.

The trend for Wisconsin isn't so clear. Although skin cancer rates have been rising for the US as a whole and may be near epidemic, Wisconsin statistics do not appear to follow the pattern. The only available data is on the mortality rate—the number of deaths from melanoma for each 100,000 population. Data from both Beth Jones of the State Division of Health and Jeri Linn Phillips of the state's Center for Health Statistics show that the mortality rate for malignant melanoma in Wisconsin has been less than the national average. Their information analyzed two periods, 1950 to 1979 and 1980 to 1985. This may be because Wisconsin is exposed to less sunlight than southern states. Less sunlight means less UV energy. Also, longer winters mean less sunbathing or less exposure.

However, statistics also show that the rate of increase in mortality from melanoma, especially in men and boys, is greater for Wisconsin than the US as a whole. We are approaching the national death rate at a faster pace than might be expected. For women and girls, the news is more encouraging. Their death rates are generally lower than those for the male population and the rate appears to have leveled off.

Turning to Wisconsin natural resources, effects of stratospheric ozone depletion will be significant and detrimental. Dr. Michael Oppenheimer, senior scientist with the Environmental Defense Fund in Washington, D.C., predicts more acid rain. Oppenheimer explains that with added ultraviolet energy reaching ground level, production of smog and other oxidants in the atmosphere will rise. These chemicals oxidize sulfur dioxide and nitrogen oxide. The oxidation process generates acid rain.

"Overall, acid rain will be produced quicker," Oppenheimer says. "The net effect is that more acid rain will fall over the continent."

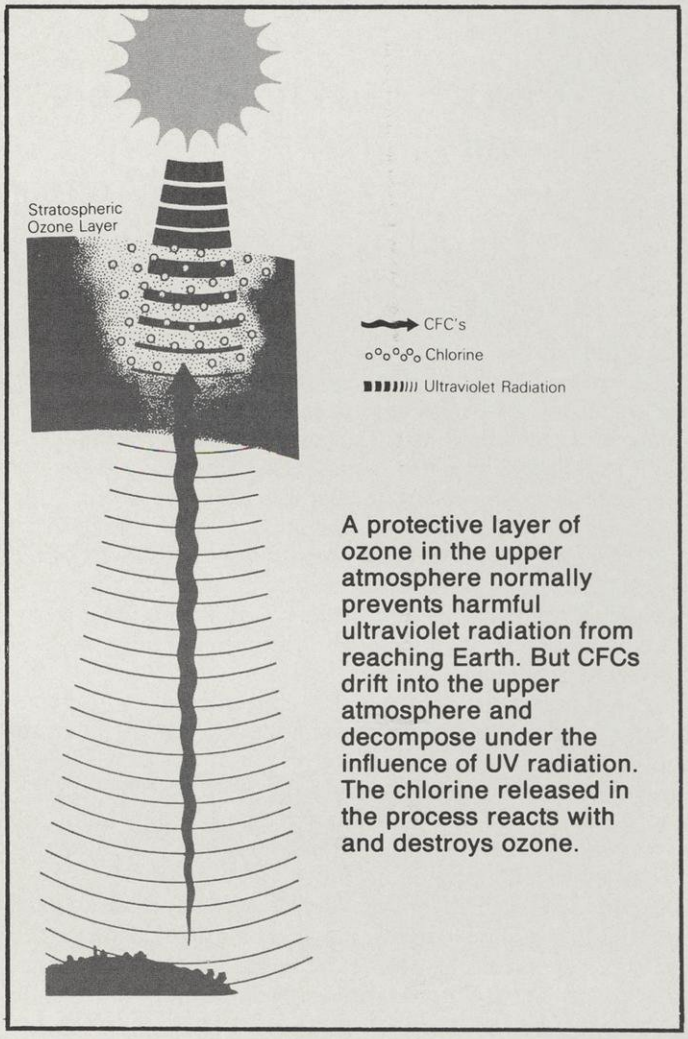
Of Wisconsin's nearly 15,000 lakes, 2,000 in the northern third of the state, and 3,500 statewide, are susceptible to acid deposition. Between 3% and 5% of north central Wisconsin's lakes are already acidic. Some of these are naturally-acidic bog lakes, but the remainder are thought to be already damaged by acid rain. About 2% of all state streams, including class one trout streams, have alkalinities that suggest moderate sensitivity to acid rain.

Game fish in several acidic lakes in northern Wisconsin contain more mercury than the safe limit of one part per million (ppm). Acid in water dissolves mercury from rocks and sediment and from there it accumulates in tissue of aquatic organisms.

The impact on ducks may be as serious and widespread as on fish, according to a recent report from the Izaak Walton League. The league says acid rain limits production by destroying critical food organisms needed by egg-laying females and ducklings. And Oppenheimer thinks that continued depletion of the ozone layer might cause eye damage among some forms of wildlife.

Wisconsin forests and agriculture will also suffer.

More ultraviolet rays mean more ground level ozone and smog. Ozone enters a leaf through its surface pores. Just as ozone damages people's lungs, it corrodes the membranes of leaf cells, decreasing photosynthetic production, which ultimately cuts yield. In 1986, UW-Madison plant physiologist Peter Reich found that an increase in ozone levels of from 0.02 to 0.1 ppm can cause up to a 50% difference in photosynthesis.



A protective layer of ozone in the upper atmosphere normally prevents harmful ultraviolet radiation from reaching Earth. But CFCs drift into the upper atmosphere and decompose under the influence of UV radiation. The chlorine released in the process reacts with and destroys ozone.

Typically, ozone measures 0.06 ppm in Wisconsin during the seven warmest months of the year, a level that may be cutting crop yields by 5 to 10%. Reich says levels up to 0.14 ppm show no visible damage to leaves, but DNR has recorded levels as high as 0.20 ppm across southeastern Wisconsin. Ozone can also decrease leaf life by as much as 20 days. By late summer, exposed plants are much less productive than those not exposed.

Other research shows that harvest of field-grown soybeans dropped 11 to 23% when exposed to simulated acid rain and other types of produce suffered localized death of plant tissue.

These effects on agriculture could be global. Daniel J. Dudek of the Environmental Defense Fund predicts that at current CFC emission rates ozone depletion over the next 40 years could claim 3% of the world's cotton crop and 1% of the corn and wheat crop.

White pine trees in Wisconsin are also affected. In 1986, a DNR study of 109 plantations in 30 eastern counties found 25% of the trees with tip burn. Greatest damage was in counties where air pollution was greatest.

Although dire effects are already occuring, Jim Hammitt, a Rand Corporation scientist, is predicting further serious trouble. Hammitt says that if chlorofluorocarbon emissions continue at the rate expected, in the absence of any regulations, we can anticipate another 2% of the ozone layer to be gone by the year 2020.

This may mean damage to many familiar products. Higher ultraviolet radiation can weaken chemical bonds that hold polymers together. Polymers are the chemical building blocks of modern plastics. Picture a brick wall: when the mortar loosens, the wall falls apart. Well, polymers are "mortar" to some building materials, packaging, housewares, paints and other goods. The potential damage is hard to estimate.

In Wisconsin, consumers use many products containing CFCs as agents or refrigerants, but no state industries manufacture or produce CFCs. Wisconsin industry, however, does use CFCs as a raw material—for refrigerators and refrigeration machinery, equipment and parts; rigid polyurethane foam plastic; and air conditioners—auto, home and commercial. There are no figures on the volume because the compounds aren't registered.

In the broad view, the US has four manufacturers of CFCs: DuPont, Allied Chemical, Pennwalt Corporation and Union Carbide. None of these has CFC manufacturing facilities in Wisconsin.

Cost estimates for nationwide CFC control and finding industrial substitutes range widely, from a low of $41 million to $541 million. The World Resources Institute has recommended a tax on CFC emissions to pay for the changes.

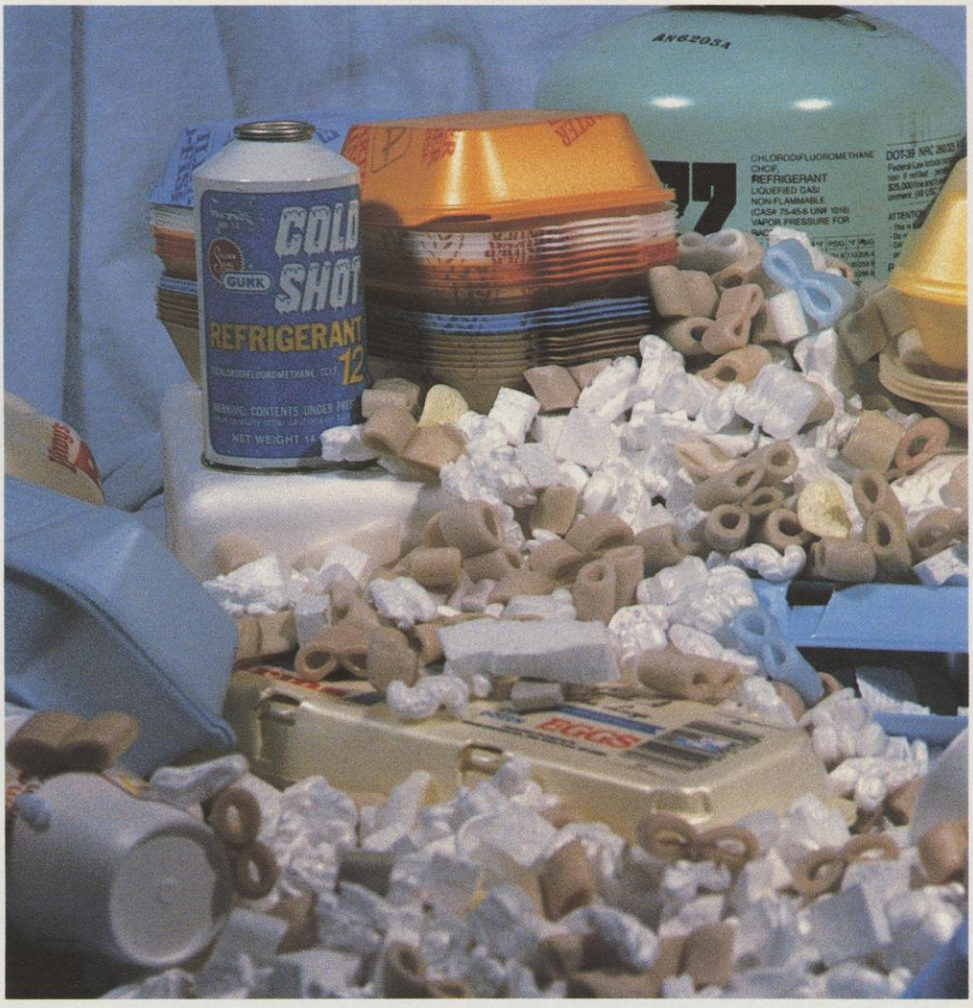
DuPont and British-based ICI Industries have agreed to produce test batches of a possibly ozone-safe air conditioner refrigerant. Though interested in making the substitute, they question who will pay for toxicity testing and also want sales guarantees before starting mass production.

Meantime, two more environmentally safe propellant substitutes have been introduced to the market, but they cost five times more than current organic products.

A Rand Corporation analyst, Kathleen Wolf, has said, "Manufacturers know the handwriting is on the wall." Companies such as GM, Ford and IBM have formed in-house task forces to reduce CFC use and develop substitutes.

There are also other encouraging signs.

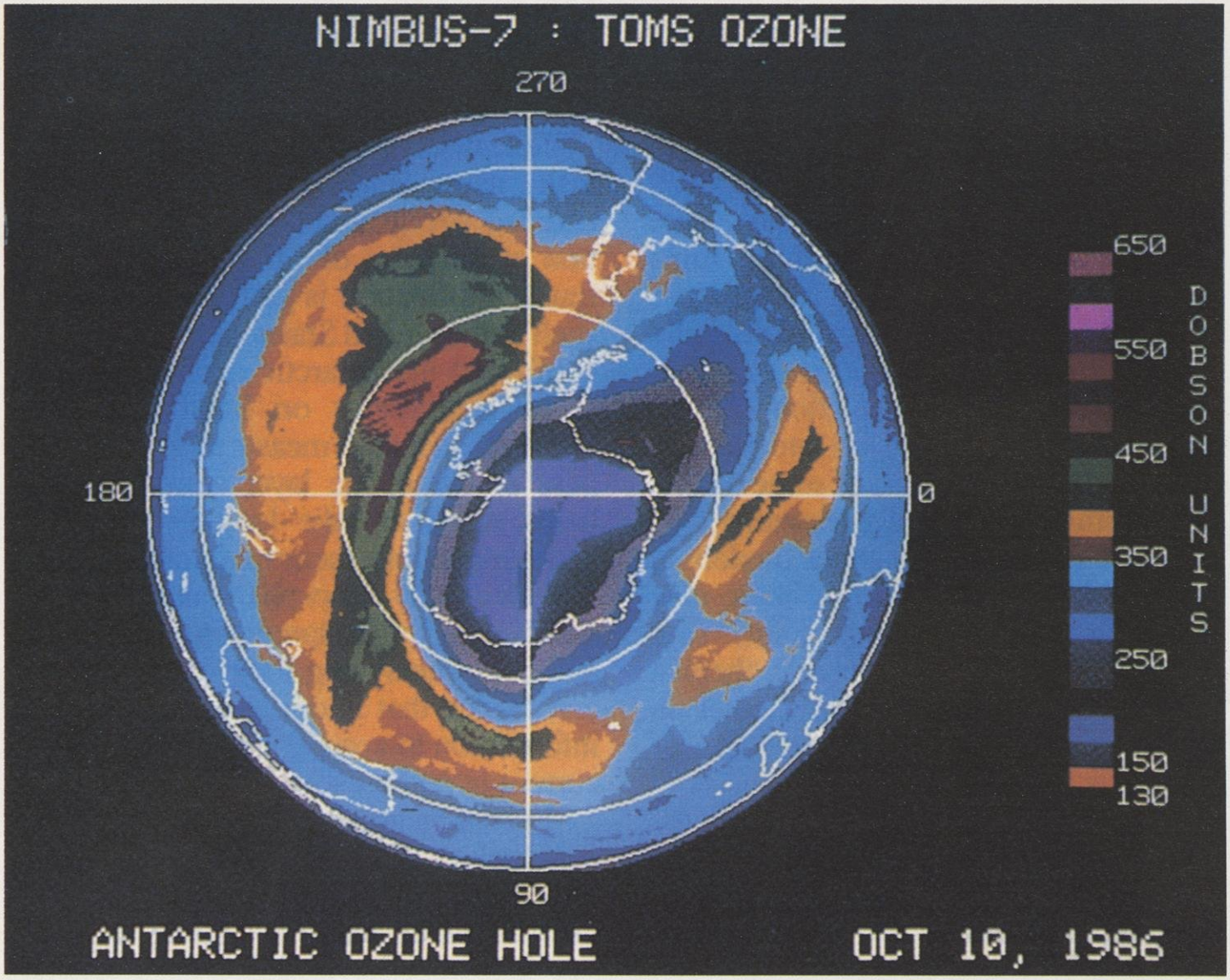
Here in Wisconsin, S.C. Johnson found substitutes for CFC propellants in its aerosol products even before the 1978



Injected into molten plastic, CFCs bubble up a foam, then are released into the atmosphere as waste. The foam is formed into fast food containers, cups, packaging material and other products. Photo by Bob Queen

How CFC use impacts on the economy

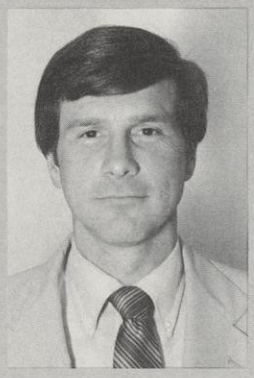
APPLICATION	NUMBER IN U.S.	VALUE/ $-BILLIONS	EMPLOY/ 1000s
Refrigeration	85 million home fridges 28 million home freezers 160,000 food stores 39,000 supermarkets 178,000 trucks 250,000 restaurants 27,000 rail cars	$11.5	524
Air conditioning	40 million homes; essentially all office, commercial, & public buildings	10.9	125
Mobile air conditioning	60-70 million	2	25
Plastic foam	Insulating foams for homes, refrigerators; food service trays and packaging; cushioning foams	2	40
Solvents	Microeletronic circuitry, high-performance air and spacecraft, and computers	Valued at billions Unknown total	
Food freezants	Frozen shrimp, fish, vegetables	0.4	Less than 1000
Sterilants	Medical items, catheters, syringes, respiratory units, medical supplies, pharmaceuticals	0.1 (sterilizing equipment)	Less than 1000
TOTAL		$26.9-billion +	715-thousand



Low ozone area (purple) over Antarctica. The dark spot at center has the least amount. Insight magazine

Ground level ozone—or smog—is a pollutant and dangerous respiratory irritant. Unfortunately, it never reaches the upper atmosphere. Photo by Dean Tvedt

A PINBALL MACHINE



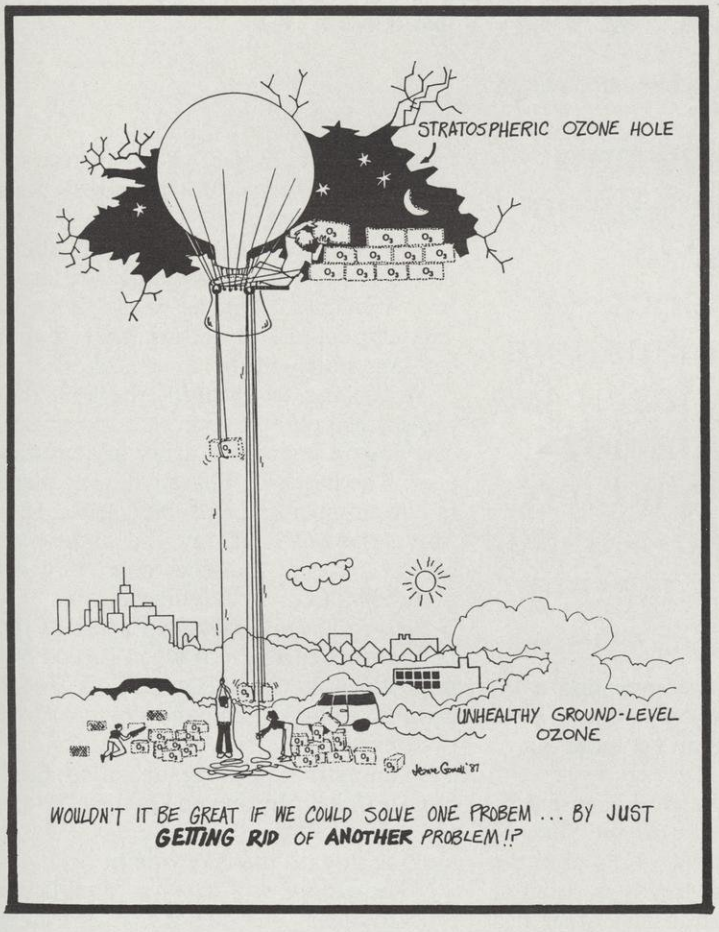
LYMAN F. WIBLE,

Administrator,
Division of Environmental Standards

The Department of Natural Resources is watching this issue as part of our "Trends Analysis" efforts. These sorts of global trends have potential impacts on Wisconsin. Global pollution problems like this are typically invisible, have *indirect* effects on human health and the environment, and may not become evident for many, many years, if at all.

One of the ecological ideas that came to be appreciated along with Earth Day in 1970 is the idea that "Mother Nature bats last." If that occurs in this case, it will certainly create far-reaching and adverse impacts on our economy and on human health.

This new generation of environmental problems has the potential for very fundamental ecological impacts. The repercussions rebound through the Earth's subsystems as if in a pinball machine. We all face the danger that we are potentially part of a grand global experiment, where the results cannot be predicted. They may only be known when the response can be measured through direct monitoring of the environment. This may be workable in some reversible processes or in localized circumstances, but in some of this gambling, the stakes may be far too high. In the immediate sense there may be nothing Wisconsin can do by ourselves, except to voice our concern widely, crisply and clearly.



ban. Digital Equipment Corporation in Salem, Mass. has substituted water-based cleaning systems for CFCs in making electrical computer parts. And DuPont, which produces 20 to 25% of the world's CFCs, now favors worldwide production limits. The company's recent position is based on its finding that, "Without question, CFCs do destroy the ozone."

Under court order following a Natural Resources Defense Council lawsuit, EPA had to consider imposing more CFC restrictions by May and completing those plans by November. Without such restrictions, Congress may well ban CFC use in the US.

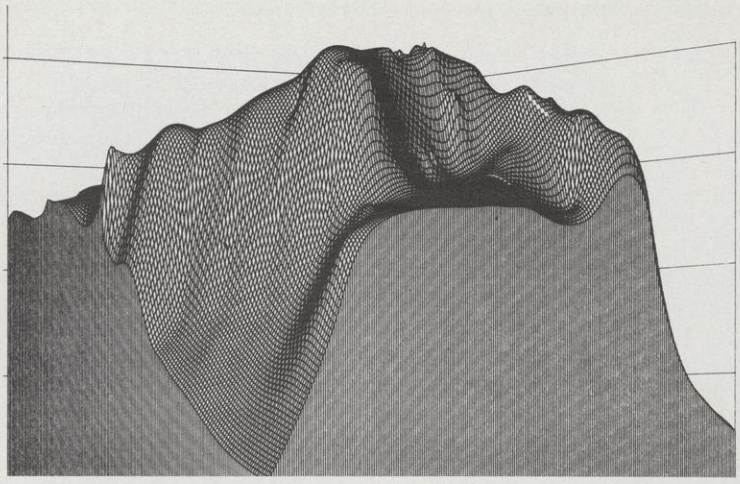
Meanwhile, Congress is interested in restricting imports.

Just recently, in late April, officials of European countries that had rejected US proposals for elimination of CFCs agreed to seek modest cuts in production. Environmental ministers from European Economic Community countries agreed to 20% cuts in production. Last year the Community supported capping CFC production at 30% above 1986 levels.

Looking to the future, it is increasingly clear that we have to get moving on preserving the ozone layer.

The Antarctic ozone hole appears for a few weeks each October and is growing larger each year. The hole is already about the size of the continental US. It also appears that ozone levels during the phenomenon are dropping: only half the concentrations observed 10 years ago were recorded last year.

A team of scientists studying the hole say it may be "nature's gentle warning" of an environmental disaster in the making. Industrial nations of the world seem to have recognized the emergency and appear to be responding. They had better not wait too long!



DNR and UW's Sea Grant Institute have combined sonar with computers to chart the Sheboygan Reef.

Computer-modeled fish: a printout for the future

Rick Mulhern, DNR Public Information

Wisconsin fish managers have developed an impressive array of tools of the trade to help keep track of what goes on in state waters. The history goes back more than 100 years to the first Fish Commission which believed that stocking fish was the main business of management. Sophisticated hatchery tools and techniques were developed to carry out this idea. Soon ways were found to keep track of fish after they were stocked. Fin clips, tags, boom shockers, electric nets, SCUBA gear, dissolved oxygen meters and various other water tests added to the body of knowledge. But in recent years the advent of radio tracking devices has heralded a revolution. When the computer and its electronic relatives were put to work revealing underwater secrets, scientific fish management took a quantum leap.

Michael Hansen, a Great Lakes sport fishing specialist with DNR explains:

"We've always used the scientific method in fish management. With that method you determine a hypothesis, test it, then analyze and interpret the results.

"But in recent years the significant advances in computer and sonar technology have become more accessible to fish managers. Now we can complement the basic, scientific method with sophisticated technology and mathematics.

"We can do studies that weren't possible in the past," Hansen says. "We can run experiments and explore strategies 'hands-off,' in much less time, and without having to tinker with the system we're examining. We can get more out of existing programs."

Impressive new technology — from sonar to bioenergetics — helps fish managers do a better, faster job for less money without disturbing habitats and with no hands-on tinkering.

The new scientific management is proving to be a bargain for the State of Wisconsin, says Hansen, who's used the tool to reveal critical trends in habitat, growth rates, population and other fish biology facts.

"We can say, with reasonable certainty, that this new scientific management is giving sport anglers in Wisconsin a better program for their license fee."

Several of the new high-tech tools have evolved over the past decade. Sonar is one of these. In the near future, DNR and the University of Wisconsin will launch a joint project that will use advanced sonar to measure fish populations in Lake Michigan.

"An accurate measure of fish abundance is critical to assessing predator/prey dynamics," Hansen says. "It's also very important for setting harvest and stocking policy in the Great Lakes."

According to Hansen, the $438,000 project will involve four research vessels carrying an impressive array of acoustics gear. The lakewide phase will take place in late summer and early fall, 1987. Tentative plans call for day and night runs along a series of transects to gather comprehensive data on fish distribution.

Last fall, a preliminary portion of the project was carried out when forage fish populations in Green Bay and at three locations in Lake Michigan were measured by sonar.

"Acoustic sampling has also been done on lakes Huron and Ontario," Hansen says. "But not on the scale we're looking at with the lakewide project.

"The vessels will carry a 'dual-beam echo sounder' — a device that transmits electrical pulses — and a device that projects the pulses into the water as sound. The sound will reflect from fish, plankton and the lake bottom and the echoes will be recorded on charts and tape.

"Some top-notch equipment will be used for recording and analyzing data: a VCR, microprocessors, and echo processors, to name a portion."

Hansen says previous acoustics sampling on the Great Lakes provides guidelines for grouping data by species and abundance. Average fish abundance will be calculated and expanded to give a lakewide population estimate. Fish abundance in the northern and southern basins and the eastern and western portions of the lake will be compared to temperature levels and other factors in the lake.

"The project packs a lot of potential," Hansen says. "If we know the lakewide distribution of forage fish, we'll be in a better spot to interpret trout and salmon migrations. Information on the abundance of forage fish at different temperature levels may help us predict when trout and salmon switch prey. We think they may do so in response to changes in the community structure of fish like alewives, smelt and other species they feed on."

A related goal is to establish training procedures for using acoustics to monitor change in the abundance of Lake Michigan fish over the long term.

"On the whole, we're looking at a rather expensive experimental model here," Hansen says. "But we're going to help out a sport fishery that generates $60 million annually."

Hansen points out that Lake Michigan's fish population supports about 200 commercial operators; that 300,000 Wisconsin sport anglers catch nearly 700,000 Lake Michigan trout and salmon annually; and that its commercial fishery boats nearly 26 million pounds of fish a year worth upwards of $3.4-million.

The sonar echoes that have transformed management on Lake Michigan can also be used to make maps. DNR along with UW's Sea Grant Institute have combined sonar with computers to chart the Sheboygan Reef. The equipment turns out highly-detailed maps of the reef including some amazing drawings with a three-dimensional look.

"The payoffs from this program should be tremendous," Hansen says. "The Sheboygan Reef lies midway between Port Washington and Muskegon, and we've been stocking it intensively since 1980. It's been the focus of other efforts, too. But until now, we didn't have access to the kind of sonar you need to get a real 'picture' of the reef. You need that kind of picture to get accurate assessments of spawning congregations."

Net sampling is the primary tool for learning which fish are at the reef. Now, however, the new reef maps will allow researchers to lower their nets to a precise point on the structure to check fish activity there. Such a systematic study of various points on the reef "should give us the best data yet on where the fish are and what they're doing," Hansen says. "The data could well be used to help us manage our stocking efforts."

Walleye stocking on Lake Mendota is part of an intense management effort featuring space-age scientific tools and techniques. Photo by Bob Queen

To obtain the maps, a ship equipped with acoustics gear must first sail a grid pattern over the reef. The gear generates and records data about the structure's surface. Then a computer integrates the data, interprets it, and turns out the maps.

Biotechnology is also in the works to help Lake Michigan fishing. Last spring DNR launched a chinook salmon project that hopes to increase catch weights for sport anglers. The project, which continues this year and next, uses steroids to cause sterility in young chinook.

"As it stands, Lake Michigan chinook probably would never exceed the current 40-pound record class on their own," Hansen says. "First, there is their inherent age at maturity. Second, declines in their alewife forage base.

"Research with coho salmon and rainbow trout suggested that sterilization of young salmonids with steroids could permanently postpone sexual maturity. That would allow the fish to live and grow beyond the time they'd normally spawn and die."

That could mean 50-pound chinook in Lake Michigan within five years, if the procedure works on this species. DNR researched the feasibility of the technique in 1983-84 through the Center For Great Lakes Studies, UW-Milwaukee and the University of Notre Dame. Fred Binkowsky of Great Lakes Studies treated several test groups of chinook eggs and fry with different concentrations of steroid. Dr. Rick Goetz of Notre Dame analyzed tissue samples from the test fish, to determine which were sterile and to what degree. The overall results indicated that the treatment yielded sterility in the test fish.

"We decided to produce sterile chinook for release into Lake Michigan," Hansen says. "We obtained permission from the federal Food and Drug Administration to let the treated fish go and released the first year class of sterile chinook last spring."

Nearly 75,000 of the fish were stocked offshore at Marinette, Door, Sheboygan and Racine counties.

New work is also being done on Lake Michigan with rainbow trout. "Right now we're in the experimental phase of a wild strain management project," Hansen says. "The idea is to plant fish species that are reliable spawners and have a good catch rate for anglers. The rainbow

trout we've been stocking in Lake Michigan to this point are being caught less and less. So we're bringing in the eggs of Skamania and Chambers Creek strains. These are West Coast fish that have been introduced by Indiana and New York, and show very good catch rates."

In the Madison area, an intensive management program on Lake Mendota will use a whole new kit of space-age scientific tools and techniques, including "bioenergetics,"to improve walleye, northern and panfishing.

The project will evaluate ecological changes that occur in a big lake when game fish stocking is increased. It will develop ways to measure the impact of stocking on various levels of the food chain and work out sonar techniques for measuring the population of open lake fishes—perch, crappie, cisco and white bass. A side benefit of these efforts will be a standard, streamlined procedure that can be used statewide to assess the number and size of fish stocks and new sonar technology that can be used as a practical management tool.

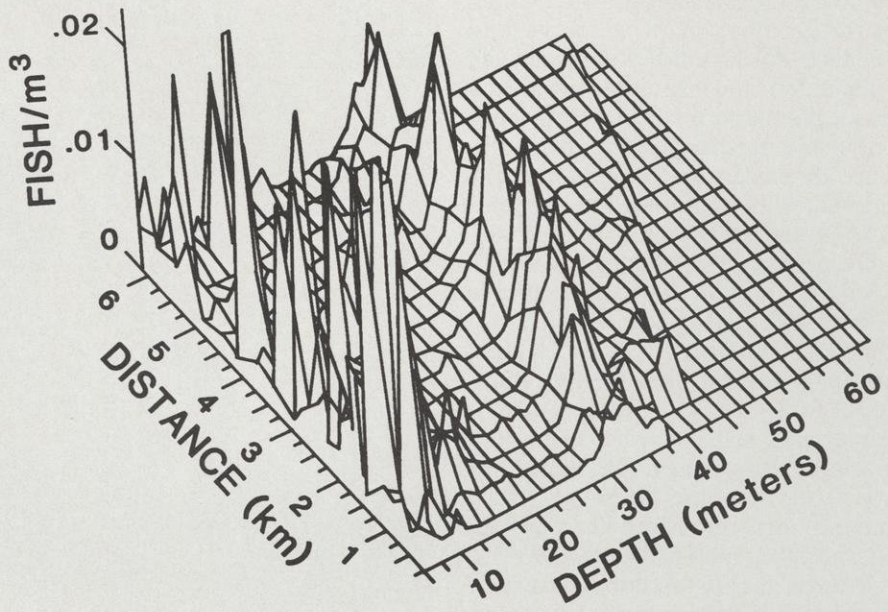
Joining forces in the project are DNR's Southern District, the Bureaus of Fish Management and Research and the UW Center for Limnology. Financing comes from Wisconsin's share of federal Dingell-Johnson monies collected from an excise tax on sport fishing equipment. Cost will run about $300,000 annually for the first three years, with a lesser amount for research observations and management in future years.

Most exciting part of the Lake Mendota work will include use of the new "bioenergetics models" created by the UW's Center for Limnology. The models are actually a series of computer programs. Researchers will use them to create models of various aspects of predator/prey communities in the lake, including estimates of eating rates and the carrying capacity of the lake. The technique has worked on the Great Lakes, but has never been tried on an inland Wisconsin lake in an actual management situation.

How does bioenergetics modeling work? Project specialist Michael Staggs, community ecologist for DNR's Bureau of Fish Management, explains:

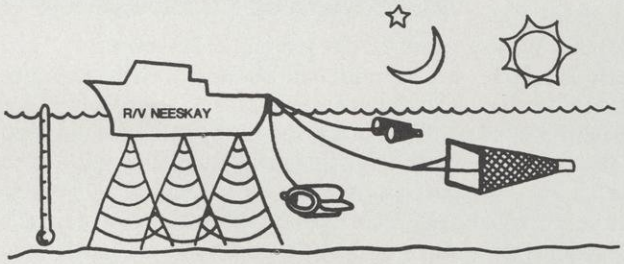
"The method allows researchers to calculate how much prey is consumed based on predator growth rate and water temperature data. Alternately, researchers can predict growth, given temperature and consumption information.

"These computers and computer programs ultimately let you project how much food the predators have eaten to achieve their growth rates.



Computers and sonar yield this graphic portrayal of Lake Michigan fish densities.

"HIGH-SPEED" EXPERIMENTS AND ACOUSTIC MAPPING



"Here you can begin to see the tremendous benefits inherent in the model. Fish managers can evaluate why, how and where to apply angler catch length limits. They can truly evaluate the efficacy of size limits or other catch regulations. And the model enables you to predict the fish-carrying capacity of lakes."

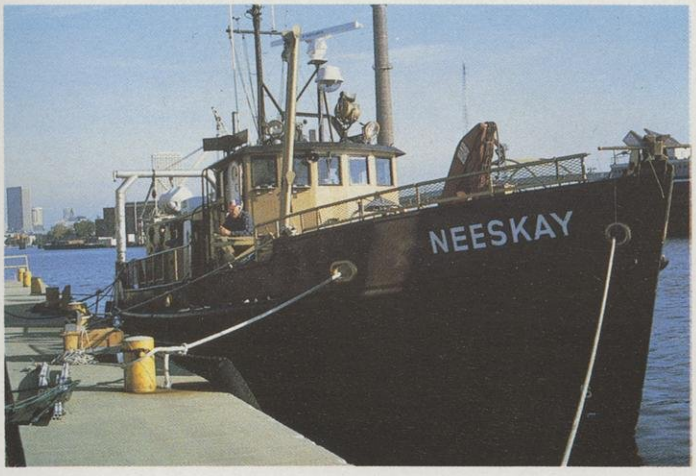
The technique is also economical, Staggs says. Without bioenergetics modeling it can get very expensive to project the eating habits of fish. An alternate method is to gather fish, then examine and measure their stomach contents — a costly process, Staggs says.

Models from the Mendota project should yield other benefits like improved water quality. In Lake Michigan, scientists have observed that stocking more predator fish results in improved water clarity. This seems to have occurred because the salmon stocked in the lake consume alewives, which eat zooplankton. Zooplankton can benefit water quality, because they eat free-floating microscopic plants called phytoplankton. It's the phytoplankton that contain chlorophyl, which so frequently color a lake green and give off disagreeable odors.

According to Staggs, researchers believe they might be able to achieve similar improved water quality on inland lakes by manipulating predator/prey relationships.

The Lake Mendota timetable calls for full-scale sampling to begin this spring. In this phase, data on population size of various species will be collected using methods ranging from acoustics to gillnetting. This information will become part of the computer model and help predict the impact of major fish stocking on the rest of the lake's food chain. The models will also link water temperature to what fish eat and how fast they grow. Finally, fish will be stocked during spring and into summer: 20-million walleye fry, 10-million northern fry, up to 50,000 northern fingerlings and 500,000 walleye fingerlings.

An underwater video camera. All photos on this page by Michael Hansen



A new project involves four research vessels carrying an impressive array of acoustics gear.

Equipment like the echo processor and sonar when combined with computers let managers dry-run ideas to see whether they work.

"It will take several years for these fish to grow large enough to consume enough smaller fish to have an impact," Staggs says. "In the meantime, if the 1987 stocking proves unsuccessful, we may do follow-up stocking in 1988 and 1989, while awaiting results of the prediction modeling."

On Lake Michigan, the new UW model will be tied in with results of the forage base sonar assessment to set DNR stocking policy and commercial fishing quotas.

The new computer technology is being used on rivers as well as lakes. Wisconsin and Minnesota are cooperating on a Mississippi River project that hopes to produce trophy walleye in pool number four near Alma. According to Staggs, a sophisticated computer program, when fed information on fish growth and mortality, can predict population sizes. The goal is to discover the combination of season length and size limit most likely to yield big walleye.

"First you feed the computer a hypothetical combination of fishing regulations," Staggs says. "Then the computer produces a long-term prediction of what that combination will give in fish size. It's a marvelous tool that generates some hard numbers and hard data to work with. Basically the same computer model is being used to evaluate walleye and bass size limits in southern Wisconsin."

Hansen thinks DNR's new scientific computer technology will have wide application in the future and holds promise for improved fisheries on a broad scale.

"When you take a good look at some of today's fish management programs," says Hansen, "it's hard to believe they had such humble beginnings. In just a few years we've gone from near-guesswork to real science all because of technology. By the year 2,000, everything DNR fish managers do will be different and a lot better."

Wisconsin Great Lakes Sport Fishing Facts

1980 Participants	411,000
Days of Participation	2,715,100
Net Social Benefits	$60,000,000
Expenditures	$49,100,000
1978 Public Costs	$2,500,000

(The above information was published in the 1982-84 biennial report of the University of Wisconsin Sea Grant Institute)

Wisconsin anglers Dena Westby (with net) and Rebecca Sus (with fish) releasing brown trout.
Painting by Artist/Naturalist Virgil Beck, Box 66, Stevens Point, WI 54481

Women and fishing

Kendra Nelson, Editorial Assistant

According to the *1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation,* nearly one of three licensed Wisconsin anglers is a woman. These 377,300 licensed female anglers, however, amount to only 20% of all Wisconsin women. If women anglers increased to match the state's 50% male participation rate, there'd be more than 900,000 additional "fisherwomen." They might outnumber the licensed male anglers. Fishing could become the new women's sport.

For a perspective, it's useful to look at composites, trends and statistics about women in the same analytical way DNR's Bureau of Fish Management has been looking at the old fishing hole for quite a while.

A generation ago, the typical woman graduated from high school, got married, had children and stayed home with them. Not long ago, women weren't even required to buy a fishing license. Hook and line fees started for men in 1909, a full generation before women had to pay. But women are paying now, for just about everything. Borne out by the fact that for the first time in history, more women are in the labor force than are outside it. Other statistics show more women than ever before are better educated, are delaying marriage and children, and are pursuing careers — and these changes will persist.

Here's another barometer of the new freedom: more and more women are hanging out the "Gone Fishin' " sign. Exclusively male pastime? Never!

Women also still outlive men. Contrary to the prediction that once women began working like men, they would begin dying like men, women who work are generally healthier and live longer than women who remain at home. Therefore, the older a generation becomes, the more female it becomes.

The influx of women to the work place also means most children now have a working mother. The childhood experience is further changing with the increase in divorce rates and out-of-wedlock births, so that half the children born today are expected to spend at least part of

their childhoods in families headed by women.

Overall, the new woman has wrought considerable change. Society, lifestyles and attitudes are all different. But what will the new woman do to fishing? It looks like she'll participate in a big way.

More work, more play

A recent US Census Bureau survey combined with information from a 1985, Market Opinion Research Corporation survey provides some insights. Among the Census Bureau's surprising findings is that the longer your work week, the more likely you are to take part in recreational activities. And women are certainly working more.

According to a report in *American Demographics* by David Bloom, associate professor of economics at Harvard: "In 1959, women aged 25 to 64 spent, on average, 572 hours a year working for pay, 1,423 hours doing housework, and 266 hours taking care of children. Work at home plus work away from home occupied 2,261 hours (or 43.5 hours per week). In 1983, after nearly a quarter century of rising labor force participation, the average woman aged 25 to 64 spent 929 hours a year working for pay, 1,252 hours doing housework, and 76 hours taking care of children. Work at home and work away from home took 2,383 hours a year by 1983 (or 45.8 hours per week)."

Since the end of World War II, the number of women in the labor force (working for pay) has gone up by 200%, compared to a 50% increase among men. Trends suggest an eventual convergence in participation rates as more women and fewer men are employed over time. By 1990, women are expected to make up half of the American labor force.

Does this mean equal participation in leisure time pursuits? Right now, that doesn't seem to be the case. According to a recent Harris Survey, men report more available leisure hours, "even though they work almost the same hours as women. The difference apparently is that women do more chores around the house that absorb their leisure time." In other words, instead of going fishing, women are keeping house.

The largest increase of women in the labor force has occurred among married women rearing children and employed throughout their middle adult years. Do these women have time for fishing? That leads to another surprise finding from the Census Bureau. When there are children in the home, adults tend to participate more in recreational activities.

> You get all dressed up to go trout fishing. You get on your waders and vest, and you get on your hat. There's no way to tell it's a woman, especially when it's a little bit dark or foggy. I can remember a boat or someone coming by, and I'd say 'Hi.' — '*#!*#! It's a woman!' they'd always exclaim. It's a little different now than 20 years ago — doesn't happen that way quite as often."
>
> — Susie Isaksen, former trustee of the American Museum of Fly Fishing, Poynette

Motivation

Women's reasons for participating in recreational pursuits are almost a recital of the benefits of outdoor Wisconsin. And fishing often fits the ticket.

A 1985 survey conducted for the President's Commission on Americans Outdoors looked at motivations for recreation. It revealed a category of so-called "Health Conscious Sociables," that included mostly women, two-thirds of the group. Persons in this category "have fitness and social motivations to be outdoors, but they do not go outdoors for excitement or to be alone." Another category, classified as "Fitness Driven," also represents more women than men. According to the survey, these people "are high on fitness motivation and low on social and excitement motivations."

But it's the "Get Away Actives," equally split between men and women, who are most likely to go fishing. For them, outdoor recreation provides opportunities to experience nature and themselves. They "are not loners, however, because they also rate social motives for recreation as important, such as the chance for the family to get together and have fun." Here are the work hard, play hard people who find that recreation reduces stress, giving them a chance to get away from tensions of job and home.

The male dominated group revealed in the survey, "Excitement-Seeking Competitives," goes for risk and danger. "They rate excitement and competition as very important reasons for outdoor recreation." Overall, they're the youngest of the groups profiled and tend to move into other motivational categories as they age.

Famed burlesque dancer Gypsy Rose Lee caught a musky in Vilas County in 1947. Photo by Staber Reese

The elderly potential

DNR's Bureau of Fish Management anticipates that the "greying" of Wisconsin means "the average angler will be substantially older in the future than today." Anglers aged 16 to 35 will decrease, those 45 to 64 will show a 57% jump by the year 2000, and 65 and older will be up 17% by then with an even greater increase by 2010.

Women's participation in fishing, however, could significantly inflate Fish Management's projections. Because of longer life expectancy than men, women account for most of the elderly. The 1980 Wisconsin census counted 141 women for every 100 men among the state's population aged 65 and older. By 2000, that margin could expand to 154 women per 100 elderly men.

In general, aging anglers will not only be more numerous, but will also exert a proportionally greater demand on the fishery because they tend to spend more time fishing than young anglers. On the other hand, although the elderly usually have less restrictions on their time, they have more physical limitations. These considerations will affect Fish Management decisions about access projects and fisheries development.

Accessible, local fishing sites could provide important social as well as recreational opportunities for elderly women. By 65, most women are widowed, while three-quarters of men at the same age are still married. Consequently, living arrangements and daily companionship differ markedly for elderly men and women. Roughly 80% of people 65 and older who live alone are women.

Elderly women account for more than half of all women who live alone. The younger women living alone are about evenly divided between singles who have never been married and those who are divorced or married but not living with their husbands. Altogether, women living alone outnumber men living alone, two to one.

"I drove for some charter captains just to learn how to fish, what baits to use . . . Now I have my own boat, the *Susie II* . . . I take out a lot of families. Often the wives and daughters say they don't want to fish — but once they get out there, they discover, yes, they do like fishing."

— Lynn Frederick,
UW Sea Grant field agent,
Sister Bay

"Ooey gooey" treats, such as this girl is using for bait, are bound to lure fish.
Photo by Allen Stenstrup

Take a child fishing

During the decade preceding the last state census, Wisconsin's female-headed families with children under 18 increased by nearly 75% to total 13% of all the state's families in 1980. Today, nationwide, almost one of four children lives with only one parent, 90% of them with their mothers, and more than a third of all women currently in their early 30s either head or will head a one-parent family.

Widowhood as the major cause of such family arrangements has been replaced by divorce and out-of-wedlock births. In divorce cases, child custody most frequently goes to women, who often become only parents. One of three children from split homes never see their fathers after divorce. Unmarried mothers, a third of them teenagers, are giving birth to more than one of five children these days.

Who will fill the traditional fatherly role and, among other things, take a child fishing? "Those are tomorrow's citizens out there, the future leaders and voters. What kind of protectors and managers of our natural resources will they be?" asked US Assistant Secretary for Fish and Wildlife and Parks, William P. Horn. "Fishing," he continued, "can provide young people with a sense of balance and proportion, and an abiding appreciation for our species' dependence on a clean, safe and livable environment."

Quality time shared with children is preciously rare for many single mothers, more than 70% of whom are employed. Complicating their recreational options, female-headed families live on lower median incomes than any other kind of family group. Angling presents special, flexible, affordable opportunities for healthy, pleasant, family outings. Fishing trips can be short, simple and near to home — or elaborately planned and anticipated weekend/vacation trips.

The favorite fishing hole need not be isolated and secret. Urban fishing sites can provide easy, close fishing fun. Proximity and convenience may be primary fishing considerations for the single women who head a quarter of all Milwaukee families with children under 18. Milwaukee is typical with its metropolitan concentration of such families, but fortunate to have multiple fishing resources.

DNR's interest

Part of DNR's mission is "to insure the right of all Wisconsin citizens to use and enjoy" the state's natural resources. The challenge, in this case, is to make it possible for more women to enjoy fishing. While many already do, the large majority of Wisconsin women do not. Indications are, however, that contemporary women would welcome the opportunity to become "fisherwomen."

The new woman often has primary responsibility for her children in our society and for introducing them to the range of life's possibilities. In old age, she is often alone with time on her hands. And though she's working more than ever during her middle years, the new woman is also pursuing outdoor recreational activities more than ever.

Fishing complements all the new woman's roles. It's a wholesome experience to share with children; a pleasurable, sociable pastime; and a chance to get away from it all. So, why aren't more women fishing?

Wisconsin Natural Resources asks its WOMEN READERS:

What is your perspective on fishing?

Women, whether you fish or not, your perceptions of fishing will affect the future of this activity. Life in the 80s has changed, and as you change so does the world you influence.

We wonder how today's women feel about fishing. So, we're asking you to share your thoughts (and we're asking our male readers to please pass this opinionnaire on to women they know — along with the article about women and fishing). Findings will be reported in an upcoming issue of *Wisconsin Natural Resources*.

Although this is not a scientific sample of opinion from all Wisconsin women, your personal responses are very important to this magazine and to DNR. Please join in this project.

Send your opinionnaire, and any other comments you'd like to make, to:

Wisconsin Natural Resources
Women and Fishing Opinionnaire
Box 7963
Madison, WI 53707

I. GENERAL ATTITUDES

1. How often do you participate in these outdoor recreational activities?

Mark the best response for each activity, using the following scale:

1 = often
2 = occasionally
3 = seldom
4 = never

a. bicycling 1 2 3 4
b. bird watching 1 2 3 4
c. boating 1 2 3 4
d. camping 1 2 3 4
e. fishing 1 2 3 4
f. golf 1 2 3 4
g. hiking 1 2 3 4
h. hunting 1 2 3 4
i. jogging 1 2 3 4
j. picnicking 1 2 3 4
k. skating 1 2 3 4
l. skiing 1 2 3 4
m. snowmobiling 1 2 3 4
n. swimming 1 2 3 4
o. tennis 1 2 3 4

2. Now, thinking about fishing, how would you rate these reasons why people fish?

Mark your opinions about the reasons for fishing listed below, using this scale:

1 = very important
2 = important
3 = unimportant
4 = very unimportant
5 = no opinion

a. for family outings
1 2 3 4 5

b. to share fishing with daughters
1 2 3 4 5

c. to share fishing with sons
1 2 3 4 5

d. to experience nature
1 2 3 4 5

e. to catch and eat fish
1 2 3 4 5

f. to catch and release fish
1 2 3 4 5

g. to catch trophy fish
1 2 3 4 5

3. Thinking about how women's fishing perceptions may differ from men's, how would you rate these reasons for fishing?

Mark your opinions about the reasons for fishing listed below, using this scale:

1 = probably more important for men
2 = probably more important for women
3 = equally important for both men and women
4 = not important
5 = no opinion

a. for personal satisfaction
1 2 3 4 5

b. to get away alone
1 2 3 4 5

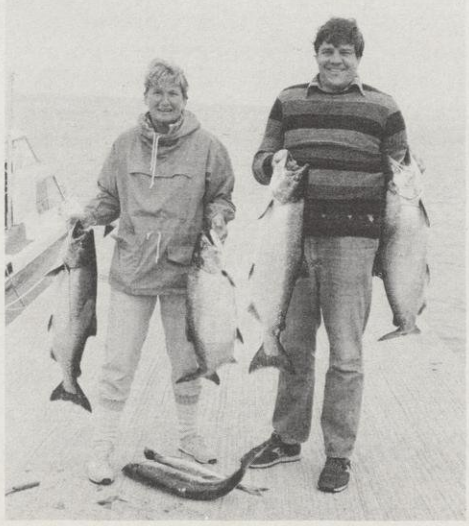
c. to be with friends
1 2 3 4 5

d. to be with spouse/partner
1 2 3 4 5

e. for family outings
1 2 3 4 5

f. to share fishing with daughters
1 2 3 4 5

g. to share fishing with sons
1 2 3 4 5



4. How do you feel about these statements describing women and fishing?

Mark your response to each reason, using the following scale:

1 = strongly agree
2 = agree
3 = neutral
4 = disagree
5 = strongly disagree

a. Fishing doesn't interest women.
1 2 3 4 5

b. Women aren't taught/don't learn to fish.
1 2 3 4 5

c. Women aren't taught/don't learn to handle boats.
1 2 3 4 5

d. Women don't know about fishing opportunities.
1 2 3 4 5

e. Women are afraid to fish alone.
1 2 3 4 5

f. Fishing clubs aren't for women.
1 2 3 4 5

g. Fishing magazines aren't for women.
1 2 3 4 5

h. Women don't know how to buy fishing gear.
1 2 3 4 5

i. Women don't have time for fishing.
1 2 3 4 5

j. Women require more creature comforts than men.
1 2 3 4 5

k. Baiting hooks is too unpleasant.
1 2 3 4 5

l. Unhooking fish is too unpleasant.
1 2 3 4 5

m. Cleaning fish is too unpleasant.
1 2 3 4 5

n. Fishing is too strenuous.
1 2 3 4 5

o. Fishing is a man's sport.
1 2 3 4 5

Good fishing! Photo by Lynn Frederick, courtesy of the University of Wisconsin Sea Grant Institute

"Tear along here to remove and send today."

II. YOUR FISHING PROFILE

1. How did you learn to fish?
(Check as many as apply.)

- ☐ never learned, not interested
- ☐ interested, but never learned
- ☐ taught myself
- ☐ father taught me
- ☐ mother taught me
- ☐ brother taught me
- ☐ sister taught me
- ☐ grandfather taught me
- ☐ grandmother taught me
- ☐ husband/partner taught me
- ☐ other female relative taught me
- ☐ other male relative taught me
- ☐ female friend taught me
- ☐ male friend taught me
- ☐ learned at childhood club/camp
- ☐ learned at adult club/outing
- ☐ learned from female, paid professional instructor
- ☐ learned from male, paid professional instructor
- ☐ learned during childhood
- ☐ learned as adult

2. Why do you fish?
(Check as many as apply.)

- ☐ don't fish, not interested
- ☐ interested, but don't fish
- ☐ for personal satisfaction
- ☐ for space (home is cramped)
- ☐ to reduce stress
- ☐ to be alone
- ☐ to relax
- ☐ to have fun
- ☐ for companionship
- ☐ to be with friends
- ☐ to be with my husband/partner
- ☐ for family outings
- ☐ to experience nature
- ☐ to catch and eat fish
- ☐ to catch and release fish
- ☐ to catch trophy fish
- ☐ for competition
- ☐ for excitement

3. Do you feel these statements describe things that have made or could make fishing more attractive for you?
(Check as many as apply.)

- ☐ don't fish, not interested
- ☐ interested, would like to try fishing
- ☐ a chance to try fishing before buying the license, gear, etc.
- ☐ someone to teach me more about fishing
- ☐ having more fishing companions
- ☐ having my husband/partner fish with me
- ☐ teaching others to fish
- ☐ belonging to a fishing club
- ☐ attending fishing skills classes
- ☐ reading more fishing magazines
- ☐ watching more fishing shows
- ☐ knowing about more fishing opportunities
- ☐ knowing more about fish
- ☐ knowing more about aquatic resources
- ☐ knowing more about fishing gear
- ☐ being able to rent fishing gear
- ☐ knowing what baits to use when
- ☐ knowing how to clean fish
- ☐ knowing how to handle boats
- ☐ having more time to fish

III. ABOUT YOU—Information please.

1. I am ____ years old.

2. Currently employed for pay?
(Check one.)

- ☐ Yes, self-employed
- ☐ Yes, full-time
- ☐ Yes, part-time
- ☐ No, seeking employment
- ☐ No, not seeking employment
- ☐ No, retired

3. Marital status: (Check one.)

- ☐ single, never married
- ☐ married
- ☐ separated/divorced
- ☐ widowed
- ☐ other

4. Is your spouse/partner currently employed for pay? (Check one.)

- ☐ Yes, self-employed
- ☐ Yes, full-time
- ☐ Yes, part-time
- ☐ No, seeking employment
- ☐ No, not seeking employment
- ☐ No, retired

5. If you have children, how many are in each of these age ranges?
(Fill in the blanks.)

under 6 years _____
6 to 17 years _____
over 17 years _____

6. Residential area: (Check one.)

- ☐ Rural
- ☐ Village (population under 10,000)
- ☐ Town (10,000 to 49,999)
- ☐ Suburban area
- ☐ City (50,000 to 499,999)
- ☐ Metropolis (over 500,000)

7. About how much of the article on women and fishing in this issue of *Wisconsin Natural Resources* magazine did you read? (Check one.)

- ☐ all of it
- ☐ most of it
- ☐ some of it
- ☐ none of it

IS THERE MORE YOU'D LIKE TO TELL US?

Feel free to enclose a letter, detailing or commenting on any of your responses above, or further sharing your insights into the issues facing women and fishing.

May we contact you? If so, please include your name, address and/or phone number.

Name _____

Address _____

City _____

State _____ Zip _____

Phone (_____) _____

"Tear along here to remove and send today."

Tear along the dotted line to remove your opinionnaire, and send it right away. We want to hear from you!

Wisconsin Natural Resources • Women and Fishing Opinionnaire • Box 7963 • Madison, WI 53707

Perhaps many women just need a chance to try it, and — they'll be hooked. Perhaps information on basic fishing equipment, places to fish, baits to use, casting techniques and how-to-do-what with a fish once it's caught, would help. Catching fish does not necessarily mean killing fish, for instance. Many anglers "catch-and-release." But if you catch a fish and want to eat it, how do you prepare it for cooking? These are often new, unfamiliar skills.

To renew the Wisconsin fishing tradition, DNR sponsors an annual Free Fishing Day. This year, it will coincide with the State Parks' Open House Day. So on June 20, forget about fishing licenses and state parks' admission fees. It's a holiday to celebrate fishing. Share it with family, friends and especially, women. Details of local activities will be publicized. Check with area DNR offices, fishing clubs, tackle and bait shops or other angling enthusiasts.

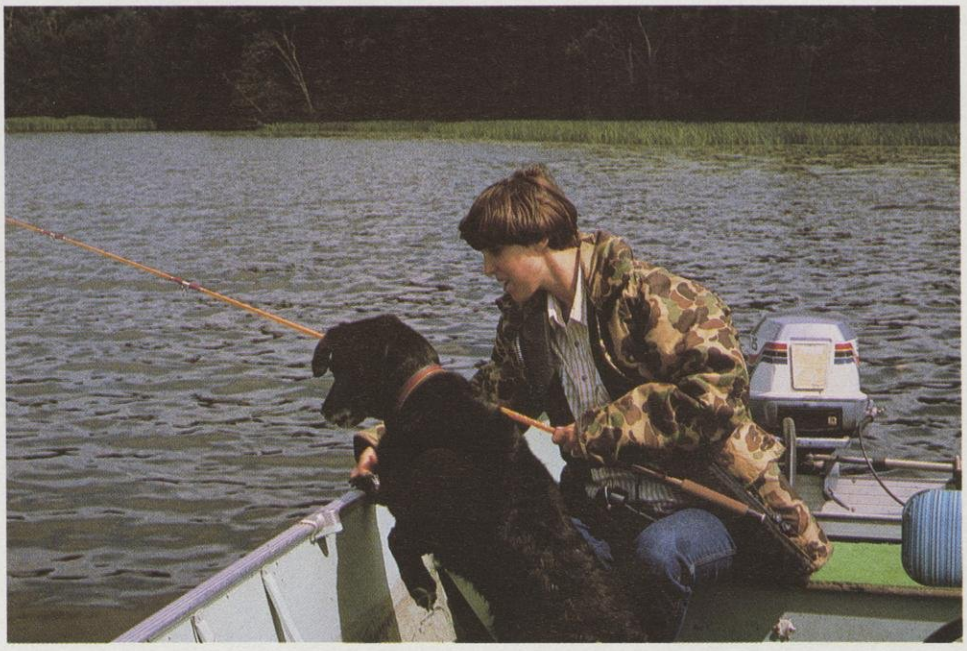
For the long-term, DNR is developing an Aquatic Resource Education Program which will teach fishing techniques and outdoor ethics, along with the importance of management and care of the aquatic environment. Details on the program can be found in Ron Poff's article in this issue entitled *How to Fish.*

One approach may be to match volunteer mentors with novices who would like to learn about fishing in a sort of "Adopt an Angler" program. Perhaps elderly, widowed women, for instance, who used to fish with their husbands, might polish up their angling skills and pass them on to eager youngsters. You, or a woman you know, could participate in the Aquatic Resources Education Program and the future of fishing in Wisconsin.

DNR looks forward to hearing from Wisconsin women — those who currently fish and those who don't. We invite you to complete the opinionnaire accompanying this article (or pass it on, along with the article, to a woman you know in order that she may fill the opinionnaire out). By reviewing your ideas and those of other women about fishing and how it fits into contemporary women's lives, we will be able to better manage Wisconsin's fishery for your enjoyment. Please share your thoughts and input, and watch for reports on opinionnaire results in upcoming issues of *Wisconsin Natural Resources.*

Women especially appreciate the health and fitness benefits of getting outdoors. Photo by Staber Reese

Fishing as seen through the mind's eye of a child. Drawing by 11-year-old Juniper Hoyer-Winfield



"Woman's best friend" and angler Elaine Schenborn, caught up in the action of hook and line. Photo by Dennis Schenborn

Wisconsin Native American Artist

Harry Whitehorse

Harry Whitehorse, a man of Winnebago heritage, is an accomplished wildlife artist. Photo by Bob Queen

Jori Olsen,
free-lance writer,
Madison

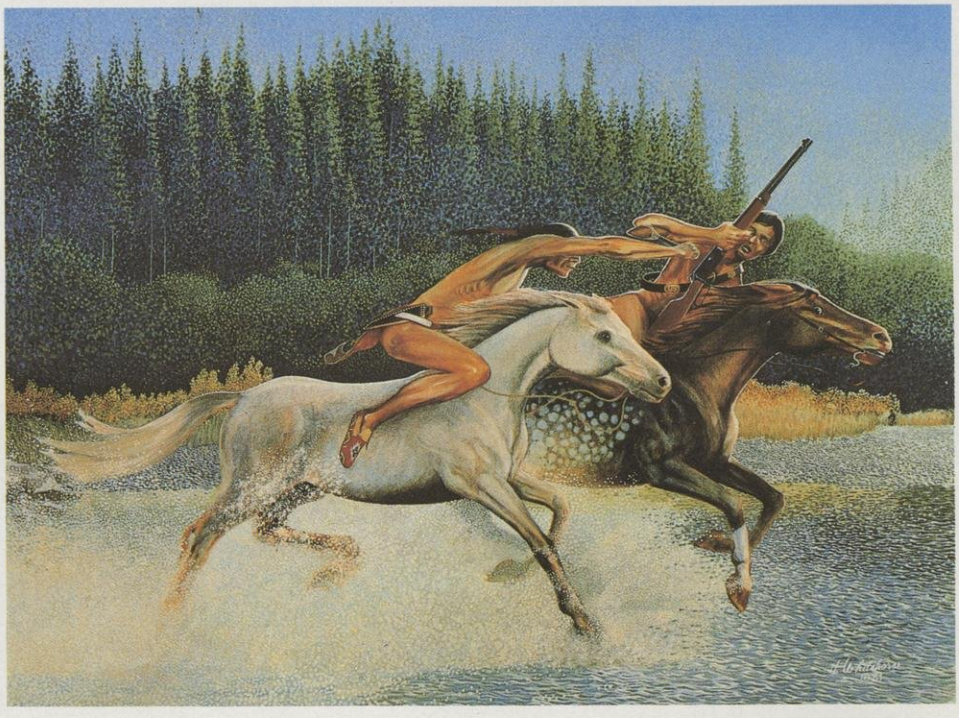
Painter, sculptor, wood-carver, iceboater, a man creating at top speed.

Harry Whitehorse and wildlife! The Indian artist and the animals he loves become one through the magic of wood and oils.

Harry's won numerous regional, state and national awards for his carving, steel sculpture and oil canvases. He's displayed in countless shows, including the Wildlife and Western Exhibition in Milwaukee and the Wisconsin Dells Art Sale and Exhibition. He won top honors at Madison's Art Fair on the Square three years in a row.

This wolf took four days to carve and paint. Photo by Jori Olsen

"Under Indian Police Arrest," 1984, oil on linen.



You can find Harry—a man of Winnebago heritage—in Madison, in a little house next to Chief Auto Parts along the south belt line.

This particular afternoon, he's deep in concentration, whittling away on the kestrel emerging from a block of wood.

Harry is surrounded by other projects in his small, front-room studio. An easel displays a nearly finished painting of an eagle. A life-size bronze stallion stands freshly polished against a wall. Dozens of carved and painted birds fill Harry's sanctuary for wildlife and Indian art.

He spends much time in this room, and never stops trying to improve on whatever he creates. And Harry never stops creating.

He's always had a lot to keep him busy. Folks who first learned about Harry through a Milwaukee newspaper 11 years ago had a hard time believing what they read: How could anyone be a wood-carver, sculptor, painter, iceboater, ex-sailor and race driver, creative auto body builder, outdoorsman, Indian historian and father of seven?

"A lot of people called me after they read the article and asked 'How can you be true?' " Harry says. "But I've built several race cars and seven iceboats, including the two skeeters my sons and I sail in Madison's Four Lakes Ice Yacht Club."

On any given day, visitors to Harry's gallery can view not only the artist's completed works, but can see the artist creating new ones. Two of the completed works are oils on linen: "Under Indian Police Arrest," painted in 1984 and "Storm," completed in 1985. Harry's versatility is evident in the works: The impressionistic "Under Indian Police Arrest" dazzles, with struggling riders on speeding horses splashing through a shallow crossing. The ominous "Storm" depicts a frontiersman with his fresh buffalo kill in the foreground, looking back to see two braves approaching with an oncoming storm.

"Heritage," an oil painting completed late last winter, depicts Harry's nephew posing in native Winnebago Indian attire in the Black River Falls area.

As stunning as the oils are, Harry has been concentrating on perfecting his wood carving. He's been fashioning a dozen pieces, mostly birds, each month. The goal? Harry hopes someday to have one of his carvings chosen for display at the annual Leigh Yawkey Woodson Art Museum in Wausau, considered one of the premier shows in the country.

"I've gone full circle," Harry says. "I started out carving things out of soap and wood when I was a boy. Then I grew up and did everything else. Now I'm back to wood carving—it's so easy, and it's so much fun."

Songbirds are popular subjects among people who want to add a Whitehorse to their collections. Harry enjoys carving ducks, too, and owls and loons. He's begun to experiment. Last fall he carved his first timber wolf and is working on a great horned owl that will have internal clockwork to make its eyes blink.

"I make the little birds in a day," Harry smiles. "The wolf took four days to carve and paint. You know these fancy tools some artists use for wood carving? You don't need all that—just a jackknife."

Attention to fine detail has been of paramount importance. Every muscle, blade of grass or feather must be correct in position and form.

Surrounded by skill

The versatile craftsman didn't always appreciate the marketability of his skills. In fact, Harry used to take such talent for granted while growing up in Tomah.

"I was raised with much of my Winnebago ancestors' traditions, values and skills. My father mixed his own paints from clay and my mother was proficient in basket-weaving, rug-making and beading with porcupine quills.

"My uncle George was a silversmith, carver, painter, sculptor and tanner. And he had more influence on me than anyone else because it seemed he could do everything. "Now that I'm older, I wish I had watched uncle George more closely when I was his apprentice. I took him for granted. I thought everybody could do what he did."

"Indians in general," he says, "were craftsmen who didn't realize how good they were. Their art was incorporated into their clothes, utensils, customs and beliefs."

After working for his uncle, Harry's interest in art continued through military service in World War II. Visits to the great art museums of the Orient and Europe convinced him to pursue art after his tour of duty.

At the University of Wisconsin-Madison, he learned human and animal anatomy. Harry studied oil painting at the Colt School of Fine Art in Madison. He also attended a local technical college where he learned welding and metal fabrication.

Harry's artistic talent, combined with metalworking skills, helped him produce a series of metal sculptures that gained him prominence in the art world.

"I had a great deal of support from my wife Marlene—we were married 36 years," Harry says. "She died of cancer last April. I always welcomed Marlene's praise or criticism for my pieces.

Harry himself feels he's very critical of each piece he completes. Rather than recarve the curve of a chickadee's bill or whittle more feathers into a nuthatch's back, Harry begins again.

"I think it's important to see how you improve from piece to piece," he says. "That ties into my feeling about abstract modern art. With work like that, how can you tell if you're getting any better at something?"

Sand and ice

Harry doesn't prefer abstract work, but the new "sail" he designed for his iceboat could be mistaken for some kind of odd monument, rather than an advance in racing technology.

The sail resembles an airplane wing mounted vertically on an iceboat. "That's about what it is, except it's made of plywood," Harry says. "I built the wing hoping it would set new records in ice sailing."

During initial voyages on Madison lakes last winter, the "sail" carried the boat at 100 mph.

But though the contraption is turning heads, it hasn't broken any speed records. So Harry will spend much of this summer in the garage, sawing, sanding and restructuring.

"Last summer, I saw land sailors use this type of wing on wheeled craft in the Nevada desert," Harry says. "The wings were made of carbon fiber and nomex, a nonstretch fabric. Right away, I knew this type of sail was the way to go. But the wings were selling for up to $100,000 in California.

"I was able to build one for $200, using photographs of the more expensive wings for models."

Until now, plywood wings have been successfully tested just on the desert—not on ice—Harry says. Average race speeds for iceboats are 60 to 100 mph. Harry hopes his skeeter will fly across the ice at more than 150 mph once he fine tunes the wing.

"If I get going that fast, I'm going to have to use a brake," Harry says, adding that iceboats usually stop when simply headed into the wind.

A brake may slow Harry's iceboat. But his imagination and creativity will keep zipping full speed.

"I'll admit I've done some interesting things in life," says Harry, 58. "But there's so much more yet to be tried."

Today as a decade ago, people wonder how this Whitehorse fellow—with his colorful history, abundant talent and busy schedule—"could be true."

Readers Write/Catchall

■ Congratulations!! to a great team. You have produced an outstanding 60 issues. I was glad to see your picture in the January/February issue. Keep up the good work.
Ruth Hine, Madison

Thanks. It's been fun. But none of us here was glad about the picture. The editor looks meaner than he really is, and the rest look happier.

NUCLEAR WASTE

■ Nuclear waste is a people problem. It affects us all one way or another. Sometime in the near future, we as a people are going to have to do something to take care of our nuclear waste instead of shoving it off on others — or else quit making the stuff.
Paul Piontek, Wabeno

Search for Cause of New Lake Trout Disease

Brad Kust, Editorial Intern

Bayfield—Research to identify a new disease that forced destruction of more than 100,000 yearling fish at the Bayfield hatchery this spring is underway at four different laboratories across the country. Meantime, water has been drained from raceways that held the infected brook and lake trout and will remain dry and empty until fall. At that time, after all other healthy fish have been stocked, the entire system, including pipes and other equipment will be decontaminated with a chlorine solution.

The federal fishery research center at La Crosse is one of the laboratories trying to pinpoint the cause of the infection as well as disease investigation labs at Bozeman, Montana; Leetown, West Virginia; and the University of Rhode Island. About 20,000 of the diseased fish have been quarantined for research.

Bruce Stewart, DNR specialist in fish health, says a chlamydia-like bacteria may cause the disease. The infection so far has been found only in lake trout, but Stewart says brook trout also had to be destroyed because they may be carriers. Larry Nelson, hatchery foreman, said 65,000 lake trout and 50,000 brook trout were destroyed. All were intended for spring stocking in Lake Superior. Also lost were 2,500 three-year-old lake trout used for brood stock.

Attempts to control the infection with medication proved unsuccessful. "This is a relatively new disease to fish culturists and not easily detected with our diagnostic techniques," says Stewart. He thinks it may be as long as a year before researchers find the answer.

Meantime, investigators are trying to learn how the disease entered the hatchery. Eggs sent to Bayfield from the federal hatchery in Iron River and/or the Michigan hatchery in Marquette may have infected the stock. "Both have had outbreaks of the disease," Nelson said.

The Bayfield Hatchery is Wisconsin's major producer of brook and lake trout for stocking in Lake Superior. Each year the hatchery produces 200,000 to 250,000 lake trout and 100,000 to 150,000 brook trout.

"It is really disheartening for me and my crew to see the fish killed like this, especially after raising them to the stocking size," Nelson said. Although the hatchery will temporarily reduce the number of trout destined for Lake Superior, the quota will be made up by existing uninfected stock, Nelson said.

■ On behalf of the Radioactive Waste Review Board, thanks to DNR for printing a high-level nuclear waste supplement in the March/April issue.

We have received favorable comments on the special report from individuals on both sides of the controversy, including the utilities, and have received many requests for reprints.
Jim Kleinhans,
Executive Director,
Wisconsin Radioactive Waste Review Board

ALDO LEOPOLD

■ What an elegant tribute to Aldo Leopold! Clay Schoenfeld's article in the January/February issue left this former Leopold student misty-eyed.

The day in 1936 that Professor Leopold offered this zoology major an apprenticeship to study the art of game management at Faville Grove under the superb tutelage of Art Hawkins, proved a turning point in my life.

Schoenfeld's article brought back memories of Leopold's occasional visits to see how we were doing at the refuge. Field excursions with him were highlights of the summer.

Lessons learned during those walks were learned forever. When I once unhesitatingly identified a hawk flying nearby, only to be gently corrected about its identity, I learned my most valuable lesson about the pitfalls of snap judgements.

When some years later I read *A Sand County Almanac*, many observations in that classic had a very familiar ring to them — of words once heard afield at the Faville Grove Wildlife Management Area.
Hilbert R. Siegler, Bangor

■ I have just read Clay Schoenfeld's excellent remembrance of Aldo Leopold in the January/February issue. What a joy to follow that word picture of a great man. Such personal experiences with Leopold must be of deep soul satisfaction.

My copies of *A Sand County Almanac* are well marked. I have quoted Leopold many times over the years, and I recently noted the 100th anniversary of Leopold's birthday in my column for Grantsburg's weekly, the *Sentinel.* I have spent many hours with Leopold's classic in my hands while listening to the harmony of nature he described.

We have a 25-acre tree farm on Bass Lake, four miles north of Danbury — have been there since 1940 — still a two-track trail to the cabin — no electricity, no phone — three kids grew up there. We have been blessed with many days of fulfillment on the land we love.
Richard E. Riis, Danbury

■ The Wisconsin Herpetological Atlas Project needs community volunteers to report local amphibian and reptile sightings. The project, sponsored by the Milwaukee Public Museum and DNR's Bureau of Endangered Resources, will compile statewide amphibian and reptile occurrence records in order to assess species' population trends and help guide management and research. If you want to participate, or for more information, contact me: Gary S. Casper, Vertebrate Zoology, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233.

■ I enjoyed reading the March/April feature, "75 years of Wisconsin forestry" — and considering Wisconsin's forestry heritage, I hope that the strategic plan for state forests includes preserving areas of old growth. Such forests are ecologically important, providing habitat for many plants and animals and making it possible for people to study and enjoy these environments.

Since 1980, the US Forest Service has favored massive clear-cutting of our old growth national forests for short-term profits. Other forest values, such as watershed protection, no longer count. I hope Wisconsin's forest planners do not make the same mistake.

Richard C. Wilson, Des Plaines, IL

■ I have never seen fringed gentians, but my 81-year-old mother immediately recognized them on the front cover of your magazine last fall. These wildflowers grew near her childhood home at Palmyra.

Moreover, places mentioned in that issue's special report on the Kettle Moraine — the Stone Elephant, Bald Knob, etc. — were frequent childhood picnic sites for her and her five brothers and sisters (the six little Footes) and their friends. General Atkinson's encampment of July 7th, 1832 was close to their rural school site of a later vintage.

Congratulations on the excellence of this publication. Every issue is a pleasure.

Barbara W. Beetow, Lake Geneva

■ In the picture on page 26 of the March/April issue, "Two men and their crosscut saw . . ." are sawing a red pine, if the bark and needles are any indication. Note the difference from the bark in the two adjacent pictures, which do show white pine.

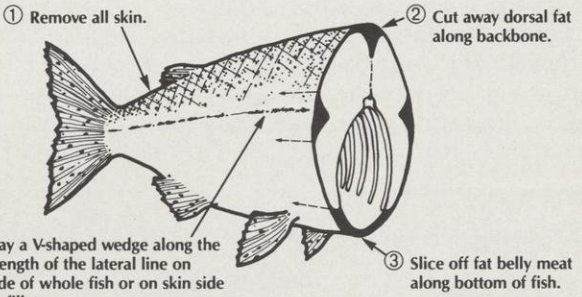
Congratulations on an enjoyable magazine that does an excellent job of balancing technical and popular interests.

Pat Travis, Rhinelander

■ I have a surplus of nut and seed producing trees, but still couldn't keep squirrels around my house. I thought it was because we were without hollow trees for them to nest in. Noticing that they would gnaw the holes bigger on my bird houses, I built appropriately modified structures that I call "squirrel houses." I built four such houses in less than a week — squirrels moved into all of them.

Jim D. Hansen, Bloomer

Cleaning Great Lakes Fish



Graphic courtesy of University of Wisconsin Sea Grant Institute

Most Wisconsin Fish Get a Clean Bill of Health

New advisories pinpoint contaminated species and waters
Search continues for sources and cleanup methods

Madison—To date, intensive monitoring of PCBs and mercury in Wisconsin has turned up only about 90 inland lakes, a few rivers and the Great Lakes where some fish are unfit for human consumption. Even in waters where fish contain high levels of PCB and mercury, generally only the large, old, fatty fish pose a threat to humans who consume them. While warnings against eating these fish are especially urgent for children and women of childbearing age, DNR points out that most fish from most waters in the state are still of excellent quality and fun to catch.

James Addis, Director of DNR's Bureau of Fish Management, says the warnings "should not dampen people's enthusiasm for angling, especially the vacationer or visitor whose fishing is limited to just a couple weeks in the summer." Only a relative handful of Wisconsin's 25,000 miles of stream and 15,000 lakes have problems.

Bruce Baker, Director of DNR's Bureau of Water Resource Management says DNR is conducting an extensive search for sources of toxicants and working to clean up those that are found. This effort is widespread: special permits limit toxic discharges; exacting water quality standards prevent additional contamination; remedial action plans have been developed to clean up Green Bay, Milwaukee and Sheboygan harbors; the environmental repair fund is at work eliminating the threat from hazardous waste dumps; Wisconsin is pushing for regional agreements to curb toxic discharges to the Great Lakes; limits have been set on release of air pollutants that cause acid rain; and a variety of research is underway to find all sources of fish contamination and prevent it. Programs are also in place to protect and educate the public about species and locations that pose a danger.

Updated fish consumption advisories have been issued for affected waters, including the Great Lakes. These are based on tests for PCBs, mercury, dioxin, and the pesticides DDT, chlordane, toxaphene and dieldrin. Any fish that do not meet US Food and Drug Administration or Wisconsin Division of Health standards are listed. Copies of the advisory, which includes locations of affected waters, sizes and species of fish that are affected and identities of the chemical contaminants, can be obtained by writing: Fish Advisory, Department of Natural Resources, Box 7921, Madison, WI 53707.

Dr. John Olson, toxicologist at the Division of Health, says the list is directed at people who eat sportfish — especially children under 15, women of childbearing age and women who are pregnant or nursing. It includes two different sets of health advice, one regarding fish that contain PCBs and pesticides, another regarding fish that contain mercury. PCBs are stored in body fat for years after ingestion, while half the mercury people ingest is eliminated in about two months. However, pregnant women are twice as sensitive to mercury, and unborn children four times as sensitive, as the rest of us. The maximum mercury level allowed in fish for human consumption is .5 parts per million (ppm). The maximum for PCB is 2 ppm. While the amount of PCB in large-sized Great Lakes fish has dropped dramatically in the past 10 years, from around 25 ppm to between two and eight now, it is still far too high.

The UW Sea Grant Institute has issued a fact sheet on "Eating Great Lakes Fish" that explains how to clean and cook them in ways that will reduce PCBs in some species by 30 to 50%. It can be obtained by writing to the UW Sea Grant Communications Office, 1800 University Ave., Madison, WI 53705.

Free Fishing—Free Parks—Clinics

Nikki Anagnostopolous, Editorial Intern

Madison—Whether you're an experienced angler or have never fished before, you'll want to take note that Saturday, June 20, is Free Fishing Day. On Free Fishing Day, fishing licenses will not be required, state parks will waive their daily admission fees and, for the first time, free fishing clinics will be offered at certain parks.

Last year marked the first Free Fishing Day after the Wisconsin legislature authorized its funding to interest more people in the sport. This year, fishing clinics are being offered to specifically interest first time anglers by giving them hands on experience and an overall idea of what fishing is and what it involves. The bureaus of Fish Management and Parks and Recreation will work with experienced volunteers from various sport fishing clubs, many under the umbrella of the Wisconsin Council of Sportsfishing Organizations, to set up the clinics and make them as rewarding, fun filled and educational as possible. Among the topics of discussion will be how to fish, where to fish, fishing regulations and how to best understand the interaction of natural resources involved in fishing. Safety rules, care for your catch and correct use of equipment will also be covered. Hopefully, no novice will walk away empty handed.

Clinics will be conducted at the parks' lakes and streams and at shelters or indoor classrooms on the property. The eight state parks or recreation areas that will be used this year are Devil's Lake, Governor Dodge near Dodgeville, Bong near Kenosha, Hartman's Creek near Waupaca, Ottawa Lake in the Southern Unit of the Kettle Moraine State Forest, Mauthe Lake in the Northern Unit, Lake Wissota near Chippewa Falls and Cadiz Springs near Monroe. Next year and in years to come, DNR plans to expand the number of parks in the project so that clinics will be available statewide.

Even though there are formal clinics at eight state parks, you don't have to go to a park or be a novice to enjoy a day of free fishing. Experienced anglers and everyone else can take advantage of the fact that the welcome mat is out at every park, every year for Free Fishing Day, the third Saturday each June.

STATE FOSSIL

As Senate sponsor of the state fossil legislation, I want to compliment you on an excellent article about trilobites in the January/February issue. Author Donald G. Mikulic correctly noted that the trilobite is a significant part of Wisconsin's heritage. Thanks for the informative recognition of our new state symbol.

Joseph J. Czarnezki, State Senator

Snagging Outlawed

Only fishing rule change this year

Deane Anderson, Editorial Intern

Madison—Effective this year, fish snagging has been banned on all Wisconsin waters. Anglers will no longer be able to catch spawning salmon and trout using heavily weighted hooks. This is the only change in fishing rules DNR has made for 1987.

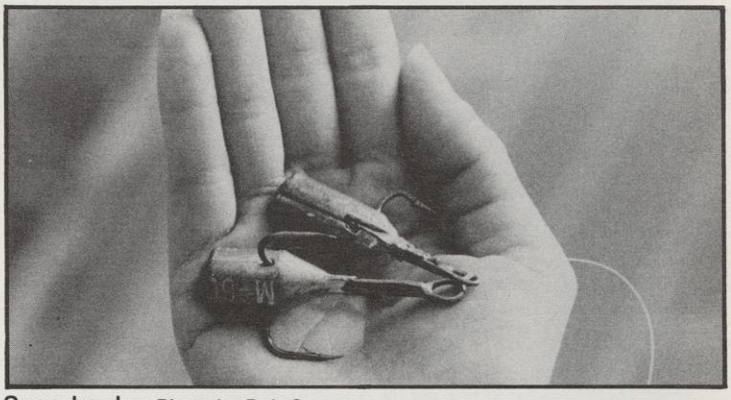
The new rule will affect rivers and streams in the following counties:

Door - Sturgeon Bay Ship Canal
Kenosha - Pike River and the Lake Michigan shoreline
Kewaunee - Kewaunee and Ahnapee rivers
Manitowoc - East Twin, West Twin and Little Manitowoc rivers
Marinette - Menominee, Little and Peshtigo rivers (all tributaries)
Milwaukee - Kinnickinnic, Menomonee and Milwaukee rivers and Oak Creek
Oconto - Pensaukee River (all tributaries, except Oconto)

According to Michael Hansen, DNR Great Lakes fishing specialist, the rule change has several objectives. They include protecting brook, brown and rainbow trout from snagging; eliminating bad publicity associated with the ethics of snagging; increasing opportunities for conventional angling of trout and salmon; and increasing availability of trout and salmon for egg collection.

No other regulation changes were made this year because DNR wants more public participation in the rule making process and wants to work on simplifying the rules. Administrative Specialist Henry Schwenn says the regulations pamphlet is sometimes criticized as too complex. "We want to make sure the angler feels confident about the rules," says Schwenn.

Plans call for seeking out non-traditional groups and individuals to express opinions about proposed rule changes.



Snag hooks. Photo by Bob Queen

The snagging ban came after public hearings last fall that supported the rule change. In addition, an advisory question submitted to the Conservation Congress favored the ban. Sportsmen's groups and many residents along Lake Michigan led the fight to outlaw snagging. They felt it taught young people unethical and indiscriminate means of fishing and contributed to vandalism, trespassing and litter problems.

Snaggers used a heavy treble hook, reeled in rapidly, to snag a spawning fish. More than 90% of the fish taken by this method were salmon. The practice started in 1972 to harvest salmon that otherwise would have died after spawning. Since then, DNR revised rules many times to better define legal snaghooks, hours of permitted fishing, and open season and waters.

From the beginning, DNR policy gave jurisdiction over snagging to counties. In recent years, several counties eliminated the practice on some or all of their rivers and streams. This concentrated snagging in fewer waters and increased opposition.

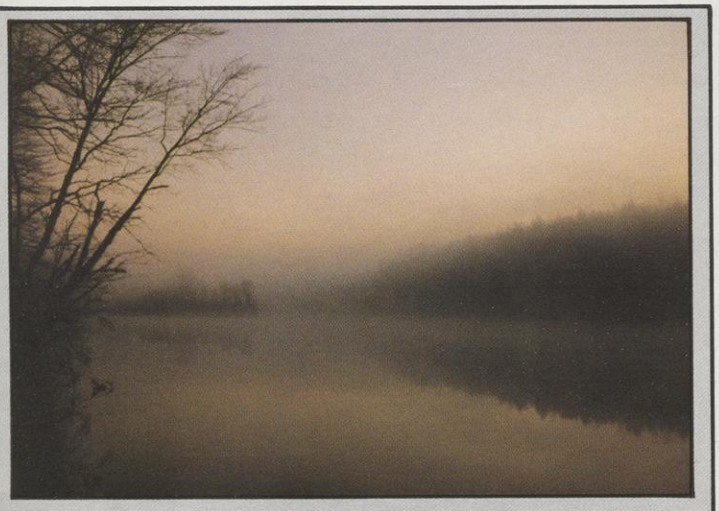
Fish managers are watching to see whether water quality will be reduced because of the increased number of salmon carcasses left after spawning. However, no such effects have been noted in rivers where the ban had been previously applied. Spawning occurs in fall, when flushing rates in rivers are high.

■ The caption you old-time loggers wrote for "Dinner outdoors at 35 below," on page 27 of the March/April issue must be another Paul Bunyan tall tale.

Almost all the lumberjacks in the picture are bare-handed and holding plates that are probably metal. No one has his cap pulled down, and not even the dog shows steam from his breathing. One man even appears to have his boot off.

I would guess it was perhaps 50 degrees warmer — human physiology hasn't changed that much in 100 years.

Dr. Allen S. Hanson, M.D., St. Croix Falls



■ My wife and I have land on the Flambeau River southwest of Ladysmith. Last October, I took this photo as the sun was starting to come up and the fog was on the river.

James M. Manning, Minneapolis, MN

■ While looking through my wife's January/February issue, I found a mistake on page 8 of the Great Lakes special report. The top picture, captioned "south of Manitowoc," appears to be north along the shoreline.

There seems to have been a lot of erosion between Sheboygan and Manitowoc in the last 20 years. How much wider is Lake Michigan from shore to shore than it was a hundred years ago? Which side of the lake has the most erosion? And how would catfish thrive as a bottom scavenger in the lake?

Dwight Baumgartner, Fennimore

You weren't the only one to notice and correct our disorientation. The view is indeed from north of Manitowoc.

DNR's Bureau of Water Regulation and Zoning knows of no comparative measurements of Lake Michigan's shore-to-shore widths for the past century. However, the Great Lakes are currently experiencing a period of high water levels. The eastern shore generally has higher erosion rates due to soil type and because of prevailing winds from the west.

DNR's Bureau of Fish Management says there are catfish at the mouths of large rivers, such as the Fox, which flow into Lake Michigan. Green Bay also has a population. However, away from shore, Lake Michigan is too cold for catfish.

■ Your March/April issue was ugly and uninformative.

Robert J. Warger, Malone

Siscowet.

Market for Oil from Lake Superior Deepwater Trout

Deane Anderson, Editorial Intern

Bayfield—The siscowet, a deepwater lake trout, is thriving again in Lake Superior and shows great potential as a commercial species, according to DNR Fish Manager Bruce Swanson.

"Siscowets have recovered from the sea lamprey faster than other species of lake trout, because they live in the deeper waters of Lake Superior," Swanson says.

Siscowet are harvested by use of gill nets at depths of 300 feet or more. Fishing in these deeper waters prevents accidental netting of other lake trout, which inhabit the shallower sections of Lake Superior. Living in chilly 39° waters, siscowets produce a lot of oil and are among the fattest animals known to man. Their bodies may contain up to 80% fat, a fact that soon may make them a valuable commercial species.

Research has shown that oil extracted from the siscowet helps reduce cholesterol in humans and prevent certain heart diseases. Currently sold in capsule form derived from ocean fish, the health-giving components of this oil were previously thought to be found only in saltwater species. Swanson says eating several siscowet fillets a week may result in the same good health effects.

The communities of Superior and Port Wing are considering development of a small industrial plant to process siscowet oil.

The harvest of Lake Superior siscowet peaked in 1981, when 237,000 pounds were netted. The catch fell to 65,000 pounds in 1986, mainly due to availability of other fillets. However, Swanson feels that as demand for the oil increases, harvest will also rise. He says there is potential for a catch of up to 2-million pounds annually.

As with other lake fish, large siscowets contain PCBs and their fillets should not be eaten. However, scientific studies in Japan show that PCBs volatilize when extracted fish oil is deodorized during processing. Dr. Paul Addis, professor of food science and nutrition at the University of Minnesota is investigating the Japanese findings but says he is confident the PCB can be removed. Addis says one of the main problems with all fish oils is that they turn rancid and lose healthful attributes. He thinks proper processing can alleviate this.

A boost in siscowet harvest would improve Lake Superior's chub population, another commercial species. Siscowets are a major predator on lake chubs.

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